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SOYBEAN ASIAN GERMPLASM EVALUATION

PROJECT SAGE

AGRONOMIC PERFORMANCE OF EXOTIC ACCESSIONS IN THE U.S.

1999

United States Department of Agriculture-Agricultural Research Service
North Carolina State University
Pioneer Hi-Bred International
Monsanto Global Seed Group
Delta & Pineland Co.
University of Illinois
University of Maryland
University of Arkansas
University of Minnesota
University of Georgia

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SOYBEAN ASIAN GERMPLASM EVALUATION (SAGE): AGRONOMIC PERFORMANCE OF EXOTIC ACCESSIONS IN THE U.S.

1999

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University of Arkansas
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University of Georgia

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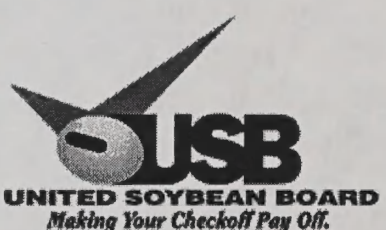

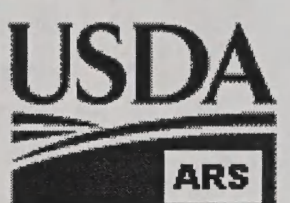

All accessions reported here are freely available for hybridization from the USDA-ARS Soybean Germplasm Collection and may be obtained by request from Randall Nelson *via* email at rlnelson@uiuc.edu or *via* FAX at 217-333-4639.

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ABOUT PROJECT SAGE

The SAGE Project (Soybean Asian Germplasm Evaluation) is a farmer - private sector - public sector initiative to increase the yield and genetic diversity of U.S. soybean. The mission of the project is to identify high-yielding exotic soybean accessions for use in U.S. variety development programs. Project SAGE is a follow-up of Project SAVE (Soybean Asian Variety Evaluation). The SAVE project began in 1996 with the field evaluation of 93 modern Asian varieties at 28 U.S. locations. In 1997, the SAVE project continued with field evaluation of 108 Asian varieties tested at 34 U.S. locations. In 1998, the SAVE project was expanded to the present SAGE by including not only modern Asian varieties, but also other promising accessions in the USDA soybean germplasm collection. 127 exotic accessions were tested in project SAGE at 24 locations in 1998. 135 exotic accessions were tested in project SAGE at 22 locations in 1999. This booklet summarizes agronomic performance of the exotic accessions in the SAGE tests.

The extensive SAGE field testing program was coordinated and partially financed through grants from the United Soybean Board. Yield trials were conducted by Pioneer Hi-Bred International, Inc., Monsanto Global Seed Group, Delta & Pineland Seed Co., the USDA-ARS, and the Universities of Illinois, Maryland, Minnesota, Georgia, and Arkansas, and N.C. State University.

RATIONALE FOR THE PROJECT

Soybean breeding is a true success story in U.S. agriculture. Since World War II, soybean breeding has raised farm yields 25% and provided farmers with genetic protection for an array of important diseases. The current vitality enjoyed by the soybean industry is due largely to successes in the breeding arena. More than 40 commercial companies and public institutions now develop varieties for the 70+ million acres of U.S. soybean.

Despite the remarkable achievements of U.S. soybean breeding, it is more difficult each year to maintain a competitive edge against international producers. U.S. breeders are attempting to solve this problem. One important tactic in the U.S. breeding effort has been to diversify strategies to produce superior varieties. Breeding for disease resistance, also known as defensive breeding, is one important strategy and provides outstanding varieties with nematode, virus and other resistances. Molecular transformation, a second avenue, is the newest breeding strategy and provides economically important genes not available through conventional breeding. The Roundup Ready varieties, now widely available, result from molecular research.

A third strategy for breeding progress, known as offensive breeding, boosts yield potential in the absence of pests and weeds. This type of breeding has been very important to yield improvement in the U.S. Current research suggests that U.S. breeders now have the opportunity to enhance our offensive breeding capabilities by tapping into the reservoir of global genetic diversity that exists in soybean. The purpose of this report is to help breeders do just this. The SAGE project seeks to identify agronomically important exotic germplasm for offensive breeding purposes. Such exotic germplasm has a strong likelihood of containing novel yield genes which can raise the yield ceiling for U.S. soybean varieties. The expansion of our current offensive breeding

efforts in this way will be an important part of the competitive edge in U.S. soybean production in the future.

The origin of the current SAGE project traces to a small cooperative research program among U.S. soybean breeders which began in 1978. Continuing into the early 1990's, many public and private soybean breeders participated in an ongoing cooperative effort to test exotic germplasm lines from the USDA Soybean Germplasm Collection. Over the 15-year span of the effort, about 2,000 lines (mostly of unknown relation to U.S. varieties) were tested on limited basis in a series of field trials, and some of these accessions were identified as having relatively good yields compared to commercial varieties. The application of these initial positive results to practical breeding was limited, however, because most breeders had no experience in the breeding of exotic germplasm and were unsure of the agronomic benefits to the farmer. As a result, there was insufficient follow-up validation of the agronomic potential of these exotic materials.

Recently, the exotic germplasm lines from these cooperative trials have attracted renewed interest in the breeding sector. The reasons for the renewed interest are 1) hypotheses that novel yield genes reside in such exotic germplasm, 2) availability of new DNA technology that helps us identify yield genes from such germplasm, 3) the ability to establish molecular genetic-distance relationships between exotic germplasm and U.S. breeding stock, and 4) legal restrictions on the use of elite breeding germplasm as parental breeding stock. The present SAGE test was initiated to confirm the agronomic and genetic potential of the promising germplasm lines identified through these earlier cooperative yield trials. The specific objectives of the SAGE project were to evaluate, in multi-location trials, the best lines identified in the above-mentioned cooperative tests of exotic germplasm, to collect data on yield, seed composition, and other useful agronomic traits, to compare the performance of these lines with the best available U.S. and Asian varieties, and to characterize each line with SSR markers to estimate the genetic relationships among the exotic germplasm and U.S. modern and ancestral varieties. The agronomic and seed composition data are presented in this publication.

SUMMARY OF RESULTS

OVERVIEW. Through the SAGE project, 135 exotic accessions were tested under U.S. growing conditions. Field evaluations were accomplished by organizing the accessions into a series of yield trials based on their maturity. A two-year summary of the most promising 44 exotic accessions is provided in Table 1. A detailed morphological description, a summary of agronomic performance, and a seed composition profile can be found for each entry by referring to Table 2 and the Table of Contents. Table 2 lists all 135 USDA accessions tested in SAGE in 1999 and provides the names of the tests in which they appeared. Entries in Table 2 are arranged in ascending order by Forage Crop (FC) or Plant Introduction (PI) number. More detailed information about each accession can be obtained from the National Plant Germplasm System (NPGS) GRIN (Germplasm Resources Information Network) website at http://www.ars-grin.gov/npgs/. To search for details about a specific accession, go to http://www.ars-grin.gov/npgs/acc/acc_queries.html and enter the Plant Introduction number you wish to learn more about (make sure to put a space between PI and the number, ex: PI 416937).

Averaged over two years, 2 exotic varieties yielded at least 90% of U.S. checks (1 Nepalese and 1 Chinese). Twenty-three exotic varieties (9 Chinese, 8 South Korean, 1 Nepalese, 1 South African, 1 Japanese, 1 Zambian, 1 Hungarian, and 1 Romanian) yielded at least 80% of the U.S. checks over years. Thirteen exotic varieties yielded at least 80% of U.S. checks in each year of the test as well as in the two-year average. Certain Japanese and Chinese varieties that performed well in the project SAVE trials (the predecessor to project SAVE) were also included in the SAVE tests as a bridge between the yield results for the two tests. Six of these thirteen yielded at least 80% of U.S. checks in at least one year of the SAGE trials, indicating that was a fair degree of agreement between the two sets of yield trials. The seven varieties from project SAVE which did not perform as well in project SAGE were almost exclusively from Japan and from maturity groups IV and later. These Japanese varieties are susceptible to bacterial pustule disease and, although ratings were not recorded, the bacterial pustule pressure may have been greater during the two years of the SAGE tests (1988 and 1999) than during the SAVE trials (1996 and 1997).

These newly identified accessions appear very promising as breeding stock for U.S. variety development. It is our hope that U.S. breeders will give these new genetic resources serious attention. Only one variety in these tests (Fen Dou 31 from China) is known to have U.S. pedigree. The other varieties from China and Japan are believed to have no common recorded ancestor with U.S. cultivars. Three Chinese cultivars which yielded greater than 80% of the U.S. checks were collected circa 1930 and, thus, predate modern breeding (PI 88310, PI 88295, and PI 91142). The variety from South Africa, which yielded greater than 80% of U.S. checks, appears unrelated to U.S. cultivars because it is susceptible to bacterial pustule, late maturing, and was collected by 1963 (PI 221717). Six of the seven South Korean varieties yielding at least 80% of U.S. checks appear unrelated to U.S. cultivars because they are small seeded and/or susceptible to bacterial pustule, late maturing, and collected before 1975. The variety from Nepal has some susceptibility to bacterial pustule and, thus, may not be closely related to U.S. varieties (PI 417931). The varieties from Europe and Zambia are more difficult to distinguish from U.S. cultivars, phenotypically, and may be more likely to trace their origins to North American breeding programs. Follow-up DNA marker studies may determine the true genetic distinction among these latter types and U.S cultivars.

All accessions reported here are freely available for hybridization from the USDA-ARS Soybean Germplasm Collection and may be obtained by request from Randall Nelson *via* email at rlnelson@uiuc.edu or *via* FAX at 217-333-4639.

METHODS

Entries, Tests, And Locations. In 1999 a total of 135 soybean accessions were evaluated from China, Japan, Egypt, Nepal, France, Hungary, Romania, Yugoslavia, Russia, South Korea, U.S., Morocco, India, South Africa, and Zambia. These 135 included the 127 which were evaluated in 1998 and 8 additional accessions in 1999. The accessions were divided into five tests and compared to elite public and private U.S. varieties. The five tests were named Test 1, Test 2, Test 3, Test 5 and Test 6 where the digit in the name refers to the approximate maturity group of the materials in the test. For example, Test 1 contains varieties predominantly of maturity group I and earlier.

Yield trials took place at 22 sites during 1999 in Minnesota, Wisconsin, Illinois, Iowa, Ohio, Maryland, Arkansas, Mississippi, North Carolina, and Georgia. Twenty-four sites were employed in 1998. At least five locations were grown for each test with two replications per test. However, some sites were lost due to flooding or drought. Please see Table 3 for a complete list of locations in 1999. Please see the 1998 SAGE book for locations in 1998. Yield and other agronomic characteristics are presented as LSMeans (least squares means) rather than simple arithmetic means, to account for occasional missing data. When a variety has no missing data in the trials, the LSMean and the arithmetic mean are identical.

Strain Designation. All accessions were identified by the Forage Crop (FC) or Plant Introduction (PI) number assigned by the USDA-ARS. Where possible, we also identified the accession by its common name. Pioneer varieties are identified by a four-digit number beginning with the number 9. Public varieties generally are named, rather than numbered, with the exceptions of IA2021 and KS4694.

Plot Size. The row spacing and number of rows per plot are listed in Table 3. In most locations the yield trials were planted in 30-inch rows, planting four rows and harvesting the two central ones. Normal local cultural practices were followed.

STATISTICAL ANALYSIS

Each individual trial was planted as a randomized complete block design with two replications. Each trial was analyzed separately and then combined across locations using SAS (SAS Institute Inc., 1985. SAS user's guide: Statistics version 6 edition. Cary, NC. 956 pp.). Variety means are reported as adjusted means from the LSMeans option of SAS, to account for occasional missing values. Although all individual trials are reported, certain trials were excluded from the combined analysis if they exhibited exceptionally low yields, exceptionally high coefficient of variation, or, in rare cases, could not be harvested prior to widespread shattering. Details are added to the tables as footnotes. At least three locations were employed for each test.

TRAITS RECORDED

Flower and pubescence color. Recorded for each variety at all locations for quality assurance. See table footnotes for abbreviations.

Maturity date. Earliest date (September 1=1) at which 95% of the pods had a mature pod color.

Height. Reported as the distance from the ground to stem tip at maturity in inches based on the mean of three plants per plot for all plots.

Lodging. Reported on a scale from 1 to 5: 1=completely erect, 5= completely prostrate.

Shattering score. Taken at 7 to 10 days after harvest unless otherwise indicated, employing a scale from 0 to 9 as follows: 0=none, 5= 40-50%, 9= 80-90% of pods in a plot shattered. Thus, shattering scores reported here did not affect yield estimates. For any plot where shattering may have occurred prior to harvest, the yield value was discarded.

Yield. Reported as bushels per acre based upon plots that were end trimmed at maturity.

100-seed weight. Reported as grams per 100 seeds.

Stem Termination. Reported as determinate (D), indeterminate (N), or semideterminate (S).

Mottling Score. Defined on a 100 seed sample basis, as the percentage of the total seed coat surface with dark pigment: 1=none, 2=1-10%, 3=10-25%, 4=25-50%, 5>50%.

Seed Quality. Scale based on disease/rotten, wrinkled or otherwise defective seed coat, and greenish color: 1=good seed, 5=poor.

Protein, oil and fatty acids composition. In 1998 and 1999, these characteristics were evaluated in two locations per test and one rep per location. Seed protein and oil were determined at 0% moisture level by near infrared reflectance (NIR), using an Infractec 1225 NR whole-grain analyzer (NIR Systems, Inc., Silver Spring, MD). Pioneer Hi-Bred International, Inc. graciously performed the oil, protein, and fatty acid evaluations.

Podwall and hilum color: Used to assure the identity of genotypes and provided by R.L. Nelson. See footnotes in each test for color abbreviations.

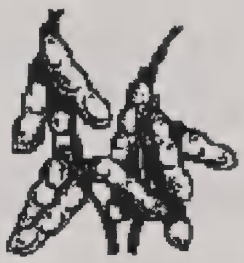


Table 1. Overall summary of the most promising exotic accessions from project SAGE averaged over two years. This table includes all exotic accessions that yielded at least 80% of the U.S. checks of similar maturity in at least one year of the study. Results are compiled from 5 separate tests grown at a minimum of 3 locations per test in each year. For additional agronomic data refer to individual yield trial summaries listed in Table of Contents. You may also refer to the USDA-ARS GRIN (Germplasm Resources Information Network) website for more information on any accession at: http://www.ars-grin.gov/npgs/acc/acc_queries.html .

PI Number	Accession Name [1]	Country of Origin	MG[2]	Test Name [3]	Code [4]	Yield (bu/ac)			Yield as Percent of Check(s) [5]		
						1998	1999	'98/'99	1998	1999	'98/'99
PI471931		Nepal	V	5	38	42	40	41	95	94	94
PI391594	Jilin No. 8	China	I	1	13	54	42	48	92	88	90
PI592919	He feng No. 31	China	0	1	5	43	40	42	84	93	88
PI399044		South Korea	V	5	15	39	38	39	88	88	88
PI221717		South Africa	VII	6	11	35	30	33	77	94	86
PI494851		Zambia	VI	6	17	47	32	40	93	77	86
PI424195B	ISZ-3	Hungary	I	1	15	50	40	45	85	84	85
PI437726	Ti-jue-baj	China	VI	6	16	46	31	39	92	75	84
PI592921	Hei nong No. 37	China	I	1	6	51	38	45	88	80	84
PI398833		South Korea	V	5	13	41	33	37	93	76	84
PI398976		South Korea	V	5	14	39	35	37	88	81	84
PI427099	Jilin No. 3	China	I	1	16	51	39	45	87	81	84
PI445837	Violeta	Romania	I	1	19	47	41	44	81	86	83
PI088295		China	I	1	9	48	40	44	82	84	83
PI408337		South Korea	V	5	29	38	34	36	85	79	82
PI408339		South Korea	V	5	30	37	35	36	83	81	82
PI091142		China	III	3	21	43	41	42	83	79	81
PI507295		Japan	III	3	32	45	38	42	88	74	81
PI399045		South Korea	V	5	16	29	36	33	78	84	81
PI088310		China	III	3	16	42	41	42	81	79	80
PI508294		South Korea	V	5	46	37	32	35	84	75	80
PI509098		South Korea	V	5	47	40	30	35	90	69	80
PI361075	Jilin No. 3	China	I	1	11	50	34	42	86	73	80
PI592947	Jin yi No. 9	China	IV	3	9	42	40	41	81	78	79
PI436682	Jilin No. 15	China	I	1	17	45	38	42	77	80	79
PI091091		China	II	2	11	41	42	42	76	80	78
PI297515		Hungary	II	2	19	45	38	42	84	72	78
PI593959	Jilin No. 31	China	II	2	4	43	39	41	80	75	78
PI574477	Fen Dou No.31	China	III	3	6	44	43	44	72	83	78

Table 1 Continued. Overall summary of the most promising exotic accessions from project SAGE averaged over two years. This table includes all exotic accessions that yielded at least 80% of the U.S. checks of similar maturity in at least one year of the study.

PI Number	Accession Name [1]	Country of Origin	MG[2]	Test Name [3]	Code [4]	Yield (bu/ac)			Yield as Percent of Check(s) [5]		
						1998	1999	'98/'99	1998	1999	'98/'99
PI227328	Manchikin	Japan	III	3	24	45	34	40	87	66	77
PI091167		China	II	2	12	43	38	41	80	74	77
PI503338	Liao dou No. 3	China	II	2	29	44	38	41	82	72	77
PI408250		Korea, South	V	5	28	39	28	34	88	66	77
PI593972	Suzumaru	Japan	I	1	8	47	34	41	81	72	77
PI091113		China	III	3	20	41	38	40	80	73	76
PI253665D		China	III	3	26	44	34	39	84	67	76
PI415074	Tie Feng 19A	China	III	3	30	41	37	39	80	72	76
PI290126B	Hei Ch'i	China	II	2	17	43	37	40	80	71	76
PI437863A		China	II	2	27	44	36	40	82	69	76
PI592923	Ken nong 2	China	I	1	7	36	34	35	70	80	75
PI261474	Kohoju	China	II	2	16	45	34	40	83	66	75
PI407975B		Korea, South	V	5	21	36	27	32	82	62	72
PI495831	Adoc	France	I	1	22	* [6]	42	42	* [6]	88	* [6]
PI153246	J-29	Belgium	0	1	20	* [6]	37	* [6]	* [6]	87	* [6]

1] Names are not available for all germplasm tested in SAGE. Duplicate names are probably samples that were collected at different times by different people.
2] Maturity Group.
3] Name of the SAGE Test in which the PI appeared in 1999.
4] Code Number for this entry in the individual SAGE tests.
5] Yield as Percent of Check(s) was calculated by dividing accession yield by the yield of the appropriate check (or checks averaged together).
6] This entry was added to SAGE tests in 1999, therefore it was not rated in 1998 and does not have a two-year average.

Table 2. List of all the accessions included in SAGE tests in 1999. Accessions are ordered by their FC (Field Crop) or PI (Plant Introduction) number. For more information regarding these accessions see the USDA-ARS GRIN (Germplasm Resources Information Network) website at http://www.ars-grin.gov/npgs/ .

PI Number	Accession Name [1]	SAGE Test in which PI appeared	Code #
FC004007B		3	10
FC029333	Laredo	3	11
FC031933		6	7
FC032175		6	8
PI068508		2	6
PI068560		3	12
PI068600		2	7
PI068658		2	8
PI070463		2	9
PI084656		3	33
PI086114	Hoten Kuroheso	3	13
PI086456	Kakukwazoshi	3	14
PI088295		1	9
PI088306		3	15
PI088310		3	16
PI088350	Kaiyuan	3	17
PI088447		3	18
PI088798		2	10
PI090566-1		3	19
PI091091		2	11
PI091113		3	20
PI091142		3	21
PI091167		2	12
PI091730-1		3	22
PI092718-2		3	34
PI153246		1	20
PI153309	Bergerac	3	23
PI157440	Kin-du	6	9
PI167240		3	35
PI189930	Mandchurische	2	13
PI198078	Punjab-1	6	10
PI221717		6	11
PI227328	Manchikin	3	24
PI227333	Ohozyu	2	14
PI248402	Manhatan	3	25
PI253653D		2	15
PI253665D		3	26
PI261474	Kohoju	2	16
PI283331	No. 380	3	27
PI290126B	Hei Ch'i	2	17
PI297505	Ji Ti No. 5	2	18
PI297515		2	19
PI297544	Primorszkaja 529	2	20
PI361064		2	21
PI361066A		1	10

Table 2 Con't. List of all the accessions included in SAGE 1999 tests. Accessions are ordered by their FC or PI number.

PI Number	Accession Name [1]	SAGE Test in which PI appeared	Code #
PI361075	Jilin No. 3	1	11
PI378664A	Hersonskaja2	1	21
PI383277	Jilin No. 5	2	22
PI391583	Jilin No. 10	1	12
PI391594	Jilin No. 8	1	13
PI398434		5	9
PI398580		5	10
PI398610		5	11
PI398612		5	12
PI398833		5	13
PI398881		3	28
PI398976		5	14
PI399044		5	15
PI399045		5	16
PI399122		5	17
PI404161	Mocinabe 7	3	29
PI407710	Foo sun No. 1	1	14
PI407720	Kao Chien Tao	2	23
PI407837		5	18
PI407910		5	19
PI407911		5	20
PI407975B		5	21
PI407993		5	22
PI407994		5	23
PI408037		5	24
PI408040-2		5	25
PI408041		5	26
PI408104		6	12
PI408219		5	27
PI408250		5	28
PI408337		5	29
PI408339		5	30
PI415074	Tie Feng 19A	3	30
PI417263	Sakyuu Ki Mame	6	13
PI417331	Shiro Pankon	5	31
PI423759		5	32
PI423773		5	33
PI423897	Tamahikari	5	6
PI423900	Aisa	5	34
PI423912	Misuzu Daizu	5	7
PI423928	Uda Daizu	6	14
PI424178B		5	35
PI424195B	ISZ-3	1	15
PI424201	Jilin No. 6	2	24
PI424390		6	15
PI424405B		3	31
PI424415		5	36
PI427099	Jilin No. 3	1	16
PI436682	Jilin No. 15	1	17
PI437437B	Ussurijscaja569	2	30

Table 2 Con't. List of all the accessions included in SAGE 1999 tests. Accessions are ordered by their FC or PI number.

PI Number	Accession Name [1]	SAGE Test in which PI appeared	Code #
PI437640A		2	25
PI437697	Schao-hi-tschi	2	26
PI437726	Ti-jue-baj	6	16
PI437863A		2	27
PI437863B		3	36
PI438085		2	28
PI445830	Flora	1	18
PI445837	Violeta	1	19
PI458073		5	37
PI471931		5	38
PI471938		5	39
PI494851		6	17
PI495831	Adoc	1	22
PI503338	Liao dou No. 3	2	29
PI506514	Akishirome	6	5
PI506651	Dai-ichi Hienuki 10-3	5	40
PI506660	Date Ao	5	41
PI507079	Nakasennari	5	42
PI507098	Nitchuu 47	5	43
PI507256	Shiro Chonkon	6	18
PI507269	Shiro Mitsu Mame	5	44
PI507295		3	32
PI507369	Touhoku 53	5	45
PI507403	Tousan 65	6	19
PI508294		5	46
PI509098		5	47
PI509106		5	48
PI511866	Nen feng No. 9	1	4
PI561388	Nakasennari	5	8
PI574477	Fen Dou No. 31	3	6
PI592919	He feng No. 31	1	5
PI592921	Hei nong No. 37	1	6
PI592923	Ken nong No. 2	1	7
PI592936	Ji Dou No. 7	3	7
PI592946	Ji Dou No. 4	3	8
PI592947	Jin yi No. 9	3	9
PI593959	Jilin No. 31	2	4
PI593972	Suzumaru	1	8
PI594172B	Gogaku	6	6
PI594304A	Tsurukogane	2	5

1] Names are not available for all accessions tested in SAGE. Duplicate names are probably samples that were collected at different times by different people.

Table 3. Row spacing and plot size for each test location of project SAGE in 1999. All trials were planted in two replications; however, the St. Joseph site lost rep 2 due to flooding.

LOCATION	TEST EVALUATED	ROW SPACING (inches)	ROWS PLANTED	ROWS HARVESTED	TOTAL FEET OF ROWS HARVESTED
Chatham, ONT	1	15	4	4	58
Lamberton, MN	1	30	4	2	16
Fargo, ND	1	30	4	2	24
Redwood Falls, MN	1	30	4	2	26
Waseca, MN	1	30	4	2	16
Ames, IA	2	30	4	2	26
Cedars Falls, IA	2	30	4	2	30
Janesville, WI	2	30	4	2	26
Johnston, IA	2	30	4	2	24
Urbana, IL	2	30	4	2	20
West Lafayette	2	24	4	2	24
Hamel, IL	3	30	4	2	24
Quenstown, MD	3	30	4	2	32
St. Joseph, IL	3	30	4	2	24
Stonnington, IL	3	30	2	2	30
Galeena, MD	5	30	4	2	28
Greenville, MS	5, 6	30	4	2	27
Keiser, AR	5	38	4	2	32
Kinston, NC	5, 6	30	2	2	26
Scott, MS	5, 6	30	4	2	24
Athens, GA	6	30	4	2	24
Rohwer, AR	6	19	5	3	54

TEST 1

(Primarily maturity group I and Earlier)

SUMMARY ACROSS LOCATIONS IN 1999

Table 4. Morphological characteristics and origin of accessions in SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999.

Code	PI Number	Accession Name	Origin	Flower Color[1]	Pubescence Color[2]	Stem Termin.[3]	Podwall Color[4]	Hilum Color[5]	Seed Coat Color[6]	Maturity Group[7]
4	PI511866	Nen feng No. 9	China	W	G	D	Br	Bf	Y	0
5	PI592919	He feng No. 31	China	W	G	D	Br	Y	Y	0
6	PI592921	Hei nong No. 37	China	W	G	D	Br	Y	Y	I
7	PI592923	Ken nong No. 2	China	P	G	D	Br	Y	Y	0
8	PI593972	Suzumaru	Japan	P	G	D	Br	Y	Y	I
9	PI088295		China	W	G	D	Tn	Y	Y	I
10	PI361066A		Yugoslavia	P	T	N	Br	Br	Y	I
11	PI361075	Jilin No. 3	China	W	G	N	Tn	Lbf	Y	I
12	PI391583	Jilin No. 10	China	W	G	D	Br	Bf	Y	II
13	PI391594	Jilin No. 8	China	P	G	N	Br	Bf	Y	II
14	PI407710	Foo sun No. 1	China	P	G	S	Br	Ibl	Y	I
15	PI424195B	ISZ-3	Hungary	W	G	N	Br	Bf	Y	I
16	PI427099	Jilin No. 3	China	W	G	N	Tn	Lbf	Y	I
17	PI436682	Jilin No. 15	China	W	G	D	Tn	Y	Y	I
18	PI445830	Flora	Romania	P	T	N	Dbr	G	Y	I
19	PI445837	Violeta	Romania	P	T	N	Br	Y	Y	I
20	PI153246	J-29	Belgium	P	G	N	Br	Y	Y	0
21	PI378664A	Hersonskaja2	Russia	P	T	N	Br	Br	Y	I
22	PI495831	Adoc	France	P	T	N	Tn	Y	Y	I

[1] P= Purple, W= White, Dp= Dark purple.
[2] G= Gray, T= Tawny.
[3] D= Determinate, N= Indeterminate.
[4] Br= Brown, Tn= Tan, Dbr= Dark Brown.
[5] Y= Yellow, Bf= Buff, Lbf= Light buff, Ibl= Imperfect Black, Br= Brown, G = Green.
[6] Y= Yellow, Lg= Light green.
[7] Maturity group obtained from USDA Soybean Germplasm database.

Table 5. Overall agronomic performance of Asian soybean varieties in the SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)	Seed Quality (1 to 5) [3]	Shattering (0 to 9) [4]	Mottling (1 to 5) [3]
1	**9171**	47.5	25	34	1.5	15.8	2.0	.	.
2	**Lambert**	42.5	20	29	1.5	16.6	2.0	.	.
3	**Parker**	47.2	29	37	3.0	17.3	2.0	.	.
4	**PI511866**	32.7	16	28	2.1	18.2	2.5	.	.
5	**PI592919**	39.6	21	27	1.9	16.6	2.0	.	.
6	**PI592921**	38.1	28	29	2.1	19.2	2.5	.	.
7	**PI592923**	34.2	17	23	1.6	19.1	2.8	.	.
8	**PI593972**	34.2	30	29	1.6	11.6	2.5	.	.
9	**PI088295**	39.7	26	31	2.8	20.3	2.0	.	.
10	**PI361066A**	32.5	26	31	4.2	11.9	1.5	.	.
11	**PI361075**	34.4	28	35	2.3	15.1	1.5	.	.
12	**PI391583**	32.0	32	35	3.3	14.3	2.5	.	.
13	**PI391594**	41.5	28	36	2.8	17.5	1.5	.	.
14	**PI407710**	33.0	27	26	2.8	18.0	2.5	.	.
15	**PI424195B**	39.6	25	34	2.3	14.6	2.0	.	.
16	**PI427099**	38.5	28	37	2.4	16.0	1.5	.	.
17	**PI436682**	37.8	26	30	3.4	16.1	2.3	.	.
18	**PI445830**	37.0	26	34	3.1	13.7	2.2	.	.
19	**PI445837**	40.9	28	36	3.7	12.9	3.0	.	.
20	**PI153246**	37.0	18	27	2.0	21.0	1.5	.	.
21	**PI378664A**	32.4	24	25	2.3	15.7	1.5	.	.
22	**PI495831**	41.8	28	39	3.1	16.9	1.8	.	.
	LSMEAN	**37.9**	**25**	**31**	**2.5**	**16.5**	**2.1**	.	.

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.
[2] Five locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.
[3] 1=best, 5=worst.
[4] 0=none; 9=80-90% shattering. Shattering occurred after harvest and thus, did not affect yield results.

Table 6. Seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999. Individual values are the average of 3 locations (one replication per location) and reported as LSMeans from the GLM procedure of SAS [1].

				Fatty Acid Composition [2] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [3]
				%					
1	9171	21.9	38.3	9.4	4.3	23.0	54.6	9.0	13.6
2	LAMBERT	22.5	40.4	10.6	4.5	21.2	56.3	7.5	15.1
3	PARKER	21.8	39.4	10.7	4.5	21.7	54.9	8.2	15.2
4	PI511866	22.3	39.6	9.8	4.7	29.5	49.0	7.2	14.4
5	PI592919	18.9	40.6	12.0	4.2	18.3	55.7	10.0	16.1
6	PI592921	21.9	39.5	10.4	4.9	24.2	52.4	8.1	15.3
7	PI592923	20.9	39.0	12.2	4.4	22.5	52.2	8.7	16.6
8	PI593972	19.4	40.9	10.6	4.1	22.6	53.7	8.9	14.7
9	PI088295	19.7	42.3	10.8	4.0	26.3	50.2	8.7	14.8
10	PI361066A	19.9	42.2	11.0	4.3	25.4	51.1	8.1	15.3
11	PI361075	18.6	40.8	10.5	4.4	23.7	52.9	8.6	14.9
12	PI391583	20.8	39.6	10.6	4.8	22.0	55.0	7.7	15.4
13	PI391594	20.8	39.5	10.4	4.9	22.0	53.7	9.2	15.2
14	PI407710	21.1	41.0	10.3	4.0	24.1	52.9	8.6	14.3
15	PI424195B	21.8	39.8	11.0	4.0	23.7	53.1	8.4	14.9
16	PI427099	18.5	40.2	10.1	4.8	23.8	52.8	8.6	14.8
17	PI436682	20.8	40.8	10.9	4.3	21.0	54.8	9.1	15.2
18	PI445830	21.9	39.7	10.8	4.5	22.3	54.8	7.8	15.2
19	PI445837	21.5	39.7	9.8	4.2	21.3	56.5	8.4	14.0
20	PI153246	20.2	41.7	10.7	3.7	26.8	50.2	8.6	14.4
21	PI378664A	20.4	42.1	10.3	4.1	25.7	51.2	8.8	14.4
22	PI495831	21.6	41.0	10.3	4.7	20.7	56.1	8.3	14.9
	LSMEAN	**20.8**	**40.4**	**10.6**	**4.4**	**23.2**	**53.3**	**8.5**	**14.9**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[3] Total of saturated fatty acids (16:0 + 18:0).
[4] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 1

(Primarily maturity group I and Earlier)

INDIVIDUAL LOCATIONS IN 1999

Table 7. Yield (bu/a) of soybean accessions in SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Chatham, ONT	Lamberton, MN	Fargo, ND	Redwood Falls, MN	Waseca, MN	LSMean
1	**9171**	64.5	44.3	36.6	37.2	54.7	47.5
2	**Lambert**	55.8	36.6	36.1	33.2	50.8	42.5
3	**Parker**	63.6	43.9	37.9	35.3	55.3	47.2
4	**PI511866**	49.0	21.6	33.7	22.8	36.2	32.7
5	**PI592919**	49.2	36.9	36.3	34.8	41.1	39.6
6	**PI592921**	53.3	32.2	31.8	27.1	46.2	38.1
7	**PI592923**	43.2	32.4	28.3	25.0	42.0	34.2
8	**PI593972**	46.4	31.3	21.1	28.1	44.2	34.2
9	**PI088295**	50.3	38.6	32.9	33.2	43.6	39.7
10	**PI361066A**	45.0	27.3	22.4	32.7	35.0	32.5
11	**PI361075**	43.7	34.5	22.4	28.8	42.6	34.4
12	**PI391583**	43.3	33.9	12.5	24.1	46.1	32.0
13	**PI391594**	51.2	42.9	29.0	36.3	48.1	41.5
14	**PI407710**	42.2	33.8	24.1	26.6	38.5	33.0
15	**PI424195B**	48.7	34.4	30.4	36.8	47.7	39.6
16	**PI427099**	52.8	40.7	14.9	34.4	49.7	38.5
17	**PI436682**	47.4	32.0	39.2	27.4	43.0	37.8
18	**PI445830**	54.2	35.2	21.2	29.6	44.6	37.0
19	**PI445837**	47.6	39.8	42.0	30.5	44.5	40.9
20	**PI153246**	49.4	30.3	36.7	34.7	33.8	37.0
21	**PI378664A**	39.5	32.7	26.9	26.3	36.8	32.4
22	**PI495831**	52.2	40.5	32.0	36.9	47.2	41.8
	LSMean	**49.6**	**35.2**	**29.5**	**31.0**	**44.2**	**37.9**
	LSD(0.05) [2]	**6.1**	**8.1**	**7.8**	**8.7**	**11.8**	**3.6**
	CV (%)	**6**	**11**	**13**	**13**	**12**	**11**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

[2] A single LSD value is given for each location although LSMeans are presented. These LSD values closely approximate the individual pairwise LSD's obtained from the LSMean provided by SAS.

Table 8. Maturity Date (September 1 = 1) of soybean accessions in SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Chatham, ONT [2]	Lamberton, MN	Fargo, ND	Redwood Falls, MN	Waseca, MN	LSMean
1	**9171**	.	21	35	23	22	25
2	**Lambert**	.	14	31	20	16	20
3	**Parker**	.	24	40	26	26	29
4	**PI511866**	.	8	26	19	12	16
5	**PI592919**	.	16	32	21	18	21
6	**PI592921**	.	20	40	25	26	28
7	**PI592923**	.	10	31	20	8	17
8	**PI593972**	.	27	41	26	26	30
9	**PI088295**	.	21	35	23	26	26
10	**PI361066A**	.	19	39	23	24	26
11	**PI361075**	.	23	40	26	25	28
12	**PI391583**	.	27	44	28	29	32
13	**PI391594**	.	22	39	25	27	28
14	**PI407710**	.	19	40	24	25	27
15	**PI424195B**	.	19	37	22	22	25
16	**PI427099**	.	24	41	24	26	28
17	**PI436682**	.	22	35	24	25	26
18	**PI445830**	.	20	37	24	24	26
19	**PI445837**	.	24	37	25	25	28
20	**PI153246**	.	17	29	19	9	18
21	**PI378664A**	.	20	35	22	19	24
22	**PI495831**	.	22	39	26	25	28
	LSMean	.	**20**	**37**	**23**	**22**	**25**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 9. Plant Height (inches) of soybean accessions in SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Chatham, ONT [2]	Lamberton, MN	Fargo, ND [2]	Redwood Falls, MN	Waseca, MN	LSMean
1	**9171**	.	34	.	33	35	34
2	**Lambert**	.	27	.	32	28	29
3	**Parker**	.	39	.	36	37	37
4	**PI511866**	.	27	.	30	27	28
5	**PI592919**	.	27	.	28	27	27
6	**PI592921**	.	28	.	29	30	29
7	**PI592923**	.	23	.	24	23	23
8	**PI593972**	.	28	.	30	30	29
9	**PI088295**	.	34	.	31	29	31
10	**PI361066A**	.	29	.	36	28	31
11	**PI361075**	.	37	.	33	36	35
12	**PI391583**	.	38	.	35	31	35
13	**PI391594**	.	37	.	35	36	36
14	**PI407710**	.	23	.	26	30	26
15	**PI424195B**	.	33	.	34	34	34
16	**PI427099**	.	40	.	34	39	37
17	**PI436682**	.	31	.	29	30	30
18	**PI445830**	.	33	.	34	35	34
19	**PI445837**	.	39	.	35	34	36
20	**PI153246**	.	27	.	30	23	27
21	**PI378664A**	.	26	.	25	24	25
22	**PI495831**	.	42	.	36	37	39
	LSMean	.	32	.	32	31	31

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 10. Plant Lodging score (1=erect, 5=prostrate) of soybean accessions in SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Chatham, ONT [2]	Lamberton, MN	Fargo, ND	Redwood Falls, MN	Waseca, MN	LSMean
1	**9171**	.	2.0	1.5	1.0	1.5	1.5
2	**Lambert**	.	1.5	1.5	1.0	2.0	1.5
3	**Parker**	.	3.0	2.0	2.5	4.5	3.0
4	**PI511866**	.	1.5	1.8	2.5	2.5	2.1
5	**PI592919**	.	2.0	1.3	1.0	3.5	1.9
6	**PI592921**	.	2.0	1.8	1.0	3.5	2.1
7	**PI592923**	.	2.0	1.5	1.0	2.0	1.6
8	**PI593972**	.	2.0	1.8	1.0	1.5	1.6
9	**PI088295**	.	3.5	2.0	1.5	4.0	2.8
10	**PI361066A**	.	4.0	3.8	5.0	4.0	4.2
11	**PI361075**	.	3.0	1.8	1.0	3.5	2.3
12	**PI391583**	.	4.0	3.3	1.0	5.0	3.3
13	**PI391594**	.	3.0	2.3	2.0	4.0	2.8
14	**PI407710**	.	3.0	2.3	1.0	5.0	2.8
15	**PI424195B**	.	2.0	1.8	2.0	3.5	2.3
16	**PI427099**	.	3.0	2.3	1.5	3.0	2.4
17	**PI436682**	.	4.0	3.0	1.5	5.0	3.4
18	**PI445830**	.	3.5	2.8	2.0	4.0	3.1
19	**PI445837**	.	4.0	2.8	3.0	5.0	3.7
20	**PI153246**	.	3.0	1.5	1.5	2.0	2.0
21	**PI378664A**	.	3.0	2.5	1.0	2.5	2.3
22	**PI495831**	.	4.0	2.3	2.5	3.5	3.1
	LSMean	.	**2.9**	**2.2**	**1.7**	**3.4**	**2.5**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 11. Seed Weight (g/100 seed) of soybean accessions in SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Chatham, ONT [2]	Lamberton, MN	Fargo, ND	Redwood Falls, MN [2]	Waseca, MN	LSMean
1	**9171**	.	14.8	19.0	14.0	15.5	15.8
2	**Lambert**	.	16.2	18.0	16.0	16.4	16.6
3	**Parker**	.	17.5	.	17.0	17.4	17.3
4	**PI511866**	.	18.6	20.5	16.0	17.8	18.2
5	**PI592919**	.	16.0	18.5	16.0	15.9	16.6
6	**PI592921**	.	18.7	20.0	18.0	20.2	19.2
7	**PI592923**	.	18.5	21.5	18.0	18.3	19.1
8	**PI593972**	.	12.1	.	10.0	12.7	11.6
9	**PI088295**	.	19.7	20.5	20.0	20.8	20.3
10	**PI361066A**	.	11.7	12.0	12.0	12.0	11.9
11	**PI361075**	.	14.3	17.0	14.0	15.1	15.1
12	**PI391583**	.	15.4	13.0	13.0	16.0	14.3
13	**PI391594**	.	16.9	19.0	16.0	18.2	17.5
14	**PI407710**	.	17.6	19.0	17.0	18.4	18.0
15	**PI424195B**	.	14.1	16.0	14.0	14.2	14.6
16	**PI427099**	.	15.3	18.0	15.0	15.8	16.0
17	**PI436682**	.	15.9	17.0	15.0	16.3	16.1
18	**PI445830**	.	15.0	13.0	14.0	12.8	13.7
19	**PI445837**	.	12.6	15.0	12.0	11.9	12.9
20	**PI153246**	.	17.1	34.0	17.0	15.9	21.0
21	**PI378664A**	.	15.9	17.0	15.0	15.1	15.7
22	**PI495831**	.	16.8	18.5	16.0	16.3	16.9
	LSMean	.	**15.9**	**18.3**	**15.2**	**16.0**	**16.5**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 12. Seed Quality score (1=good, 5=poor) of soybean accessions in SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Chatham, ONT [2]	Lamberton, MN	Fargo, ND [2]	Redwood Falls, MN [2]	Waseca, MN	LSMean
1	9171	.	2.0	.	.	2.0	2.0
2	Lambert	.	3.0	.	.	1.0	2.0
3	Parker	.	2.0	.	.	2.0	2.0
4	PI511866	.	3.0	.	.	2.0	2.5
5	PI592919	.	2.0	.	.	2.0	2.0
6	PI592921	.	2.0	.	.	3.0	2.5
7	PI592923	.	2.5	.	.	3.0	2.8
8	PI593972	.	3.0	.	.	2.0	2.5
9	PI088295	.	2.0	.	.	2.0	2.0
10	PI361066A	.	2.0	.	.	1.0	1.5
11	PI361075	.	2.0	.	.	1.0	1.5
12	PI391583	.	3.0	.	.	2.0	2.5
13	PI391594	.	2.0	.	.	1.0	1.5
14	PI407710	.	2.0	.	.	3.0	2.5
15	PI424195B	.	2.0	.	.	2.0	2.0
16	PI427099	.	2.0	.	.	1.0	1.5
17	PI436682	.	2.5	.	.	2.0	2.3
18	PI445830	.	2.5	.	.	2.0	2.2
19	PI445837	.	4.0	.	.	2.0	3.0
20	PI153246	.	2.0			1.0	1.5
21	PI378664A	.	2.0			1.0	1.5
22	PI495831	.	2.0			1.5	1.8
	LSMean	.	2.3	.	.	1.8	2.1

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

TEST 1

COMBINED RESULTS FOR 1998 AND 1999

Table 13. Two-year summary for yield of soybean accessions in SAGE Test 1 (primarily maturity group I and earlier) evaluated in 1998 and 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	MG [2]	Yield (bu/ac)			Yield as Percent of Appropriate Maturity Check(s) [4]		
			1998	1999	'98/'99 [3]	1998	1999	'98/'99 [3]
1	9171	I	59.4	47.5	53.5			
2	Lambert	0	51.5	42.5	47.0		%	
3	Parker	I	57.6	47.2	52.4			
4	PI511866	0	35.3	32.7	34.0	69	77	72
5	PI592919	0	43.2	39.6	41.4	84	93	88
6	PI592921	I	51.2	38.1	44.7	88	80	84
7	PI592923	0	35.9	34.2	35.1	70	80	75
8	PI593972	I	47.1	34.2	40.7	81	72	77
9	PI088295	I	48.1	39.7	43.9	82	84	83
10	PI361066A	I	45.3	32.5	38.9	77	69	73
11	PI361075	I	50.3	34.4	42.4	86	73	80
12	PI391583	II	45.8	32.0	38.9	78	68	73
13	PI391594	II	54.1	41.5	47.8	92	88	90
14	PI407710	I	40.7	33.0	36.9	70	70	70
15	PI424195B	I	50.0	39.6	44.8	85	84	85
16	PI427099	I	50.8	38.5	44.7	87	81	84
17	PI436682	I	45.3	37.8	41.6	77	80	79
18	PI445830	I	46.1	37.0	41.6	79	78	79
19	PI445837	I	47.4	40.9	44.2	81	86	83
20[5]	PI153246	0	.	37.0	.	.	87	.
21[5]	PI378664A	I	.	32.4	.	.	68	.
22[5]	PI495831	I	.	41.8	.	.	88	.
	LSMean		47.6	37.9	42.1	80	79	80

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] Maturity group assigned by USDA Soybean Germplasm Collection.
[3] Yield averaged over 1998 and 1999.
[4] Yield as Percent of Check(s) was calculated by dividing accession yield by the yield of the appropriate check (or checks averaged together).
[5] These accessions were only evaluated in 1999.

Table 14. Two-year summary (1998 and 1999) of overall agronomic performance of Asian soybean varieties in the SAGE Test 1 (primarily maturity group I and earlier). Means are presented as LSMeans from the GLM procedure of SAS [1]. Only traits that were recorded in both years are reported here.

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)	Seed Quality (1 to 5) [3]
1	**9171**	53.5	19	34	1.5	16.5	1.8
2	**Lambert**	47.0	15	31	1.6	17.0	2.1
3	**Parker**	52.4	23	39	2.9	17.8	2.3
4	**PI511866**	34.0	11	28	2.0	18.7	2.3
5	**PI592919**	41.4	15	29	2.0	16.8	2.4
6	**PI592921**	44.7	23	31	2.3	20.3	2.9
7	**PI592923**	35.1	12	25	1.5	19.6	2.6
8	**PI593972**	40.7	25	28	1.5	11.8	2.3
9	**PI088295**	43.9	21	32	3.0	21.7	2.5
10	**PI361066A**	38.9	21	32	3.8	12.2	1.9
11	**PI361075**	42.4	24	37	2.2	15.3	1.5
12	**PI391583**	38.9	27	36	3.4	15.6	2.7
13	**PI391594**	47.8	24	37	2.5	18.5	1.9
14	**PI407710**	36.9	21	28	3.6	19.2	3.3
15	**PI424195B**	44.8	20	35	2.1	15.1	2.0
16	**PI427099**	44.7	24	39	2.3	16.1	1.7
17	**PI436682**	41.6	22	33	3.3	16.7	2.6
18	**PI445830**	41.6	21	36	3.0	14.5	2.3
19	**PI445837**	44.2	23	36	3.4	13.3	2.5
20[4]	**PI153246**	.	.	.	.	.	.
21[4]	**PI378664A**	.	.	.	.	.	.
22[4]	**PI495831**	.	.	.	.	.	.
	LSMean	**42.8**	**20**	**33**	**2.5**	**16.9**	**2.3**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.
[2] Five locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.
[3] 1=best, 5=worst.
[4] These accessions were only tested in 1998.

Table 15. Two-year summary (1998 and 1999) of seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 1 (primarily maturity group I and earlier). Only accessions tested in both years have values reported here.

				Fatty Acid Composition [1] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [2]
		%							
1	9171	22.0	39.5	9.6	4.1	23.6	54.9	8.1	13.7
2	LAMBERT	22.6	41.7	11.0	4.5	21.5	56.0	7.1	15.5
3	PARKER	22.0	40.7	10.7	4.5	24.2	53.3	7.5	15.2
4	PI511866	22.3	40.9	10.2	4.6	29.9	48.8	6.8	14.7
5	PI592919	19.5	40.9	12.2	4.2	18.9	55.8	9.1	16.3
6	PI592921	21.6	41.2	10.4	4.7	26.7	51.1	7.2	15.0
7	PI592923	20.8	40.0	12.7	4.4	23.6	51.4	8.1	17.0
8	PI593972	19.8	40.9	10.7	4.1	23.5	53.6	8.1	14.8
9	PI088295	20.2	43.3	11.1	4.0	26.7	50.3	8.1	15.1
10	PI361066A	19.7	42.8	11.4	4.2	24.8	52.0	7.7	15.5
11	PI361075	18.7	41.3	10.6	4.5	27.1	50.6	7.3	15.0
12	PI391583	21.2	41.3	10.6	4.6	24.3	53.6	7.0	15.2
13	PI391594	20.8	40.8	10.5	4.8	24.1	52.5	8.4	15.2
14	PI407710	21.8	41.7	10.6	4.0	24.9	52.7	8.0	14.5
15	PI424195B	21.1	41.1	11.4	3.9	24.1	53.0	7.9	15.2
16	PI427099	18.5	40.7	10.2	4.8	24.8	52.6	7.7	15.0
17	PI436682	21.1	42.0	11.0	4.2	22.4	54.4	8.2	15.2
18	PI445830	21.8	40.9	10.9	4.5	22.6	54.8	7.5	15.3
19	PI445837	21.7	40.8	10.0	4.1	21.5	56.6	8.0	14.1
20	PI153246	.	.	.	.	.	.	.	.
21	PI378664A	.	.	.	.	.	.	.	.
22	PI495831	.	.	.	.	.	.	.	.
	LSMEAN	20.9	41.2	10.8	4.3	24.1	53.0	7.7	15.0

[1] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[2] Total of saturated fatty acids (16:0 + 18:0).
[3] This accession was added to the study in 1999.
[4] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 2

(Primarily maturity group II)

SUMMARY ACROSS LOCATIONS IN 1999

Table 16. Morphological characteristics and origin of accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1999.

Code	PI Number	Accession Name	Origin	Flower Color[1]	Pubescence Color[2]	Stem Termin.[3]	Podwall Color[4]	Hilum Color[5]	Seed Coat Color[6]	Maturity Group[7]
4	PI593959	Jilin No. 31	China	P	G	D	Br	Bf	Y	II
5	PI594304A	Tsurukogane	Japan	W	G	N	Br	Y	Y	I
6	PI068508		China	W	G	D	Br	Bf	Y	II
7	PI068600		China	P	G	N	Br	Ib	Y	II
8	PI068658		China	P	G	S	Br	Ib	Y	II
9	PI070463		China	W	G	N	Dbr	Bf	Y	II
10	PI088798		China	W	Lt	S	Br	Bl	Y	II
11	PI091091		China	W	G	S	Tn	Y	Y	II
12	PI091167		China	W	G	N	Br	Y	Y	II
13	PI189930	Mandchurische	France	W	G	D	Br	Lbf	Y	II
14	PI227333	Ohozyu	Japan	W	G	D	Br	Lbf	Y	II
15	PI253653D		China	W	G	D	Br	Bf	Y	I
16	PI261474	Kohoju	China	W	G	D	Br	Y	Y	II
17	PI290126B	Hei ch'i	China	W	T	N	Br	Br	Y	II
18	PI297505	Ji ti No. 5	China	W	G	N	Br	Lbf	Y	I
19	PI297515		Hungary	W	G	N	Tn	Y	Y	II
20	PI297544	Primorszkaja 529	Russia	W	G	N	Br	Lbf	Y	II
21	PI361064		Yugoslavia	W	T	N	Br	Br	Y	II
22	PI383277	Jilin No. 5	China	W	G	N	Dbr	Y	Y	II
23	PI407720	Kao chien tao	China	W	G	S	Br	Y	Y	II
24	PI424201	Jilin No. 6	China	W	G	D	Br	Bf	Y	II
25	PI437640A		China	P	G	N	Tn	Lg	Lg	I
26	PI437697	Schao-hi-tschi	China	W	Lt	N	Bl	Bl	Y	II
27	PI437863A		China	W	G	N	Br	Lbf	Y	II
28	PI438085		China	P	G	N	Dbr	Lbf	Y	II
29	PI503338	Liao dou No. 3	China	P	G	N	Tn	Y	Y	II
30	PI437437B	Ussurijscaja	Russia	P	Lt	N	Br	Bl	G	II

[1] P= Purple, W= White, Dp= Dark purple, Lt- Light Tawny.
[2] G= Gray, T= Tawny.
[3] D= Determinate, N= Indeterminate.
[4] Br= Brown, Tn= Tan, Dbr= Dark Brown.
[5] Y= Yellow, Bf= Buff, Lbf= Light buff, Ibl= Imperfect Black, Br= Brown, Bl – Black, Lg= light green.
[6] Y= Yellow, Lg= Light gray, G – Gray.
[7] Maturity group assigned by USDA Soybean Germplasm Collection.

Table 17. Overall agronomic performance of Asian soybean varieties in the SAGE Test 2 (primarily maturity group II) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)	Seed Quality (1 to 5) [3]	Shattering (0 to 9) [4]	Mottling (1 to 5) [3]
1	**9254**	52.9	20	33	1.5	12.7	2.5	1.0	.
2	**IA2021**	49.7	17	32	2.2	14.4	1.5	1.0	.
3	**Savoy**	53.1	18	31	1.8	16.0	2.5	1.0	.
4	**PI593959**	38.9	16	36	2.8	17.1	2.0	1.0	.
5	**PI594304A**	33.8	18	27	1.9	23.8	3.0	2.0	.
6	**PI068508**	38.4	15	29	3.5	12.8	2.3	1.0	.
7	**PI068600**	33.6	12	37	3.3	13.1	3.3	1.5	.
8	**PI068658**	32.7	11	30	3.5	13.4	2.8	2.5	.
9	**PI070463**	36.5	17	35	3.3	16.5	2.3	1.0	.
10	**PI088798**	36.1	13	29	2.5	19.6	2.5	1.0	.
11	**PI091091**	41.5	19	31	2.9	16.4	2.5	1.0	.
12	**PI091167**	38.3	14	31	2.5	17.6	2.5	1.5	.
13	**PI189930**	37.2	16	31	2.8	17.2	2.5	1.5	.
14	**PI227333**	37.6	15	30	2.6	19.1	3.0	1.5	.
15	**PI253653D**	32.5	12	31	3.5	13.1	3.0	1.5	.
16	**PI261474**	34.1	14	31	2.6	18.9	3.0	1.5	.
17	**PI290126B**	36.6	14	32	2.7	17.1	2.0	1.0	.
18	**PI297505**	33.4	16	35	2.9	15.1	2.5	2.0	.
19	**PI297515**	37.5	13	31	2.7	14.0	2.5	2.0	.
20	**PI297544**	36.4	16	31	2.5	19.3	2.5	1.5	.
21	**PI361064**	38.1	24	32	2.8	12.5	1.5	1.0	.
22	**PI383277**	40.9	19	39	3.5	16.9	2.0	2.0	.
23	**PI407720**	39.0	17	30	2.6	17.0	2.5	1.0	.
24	**PI424201**	35.7	13	27	2.3	13.4	2.0	1.5	.
25	**PI437640A**	35.7	6	32	2.5	14.4	1.8	2.0	.
26	**PI437697**	38.0	16	40	3.2	13.9	2.3	1.0	.
27	**PI437863A**	35.6	16	31	2.5	14.9	3.0	1.0	.
28	**PI438085**	34.5	16	36	3.3	15.0	2.3	1.0	.
29	**PI503338**	37.6	16	35	2.4	14.5	2.5	1.0	.
30	**PI437437B**	34.2	15	33	3.2	15.6	2.7	1.5	.
	LSMEAN	**38.0**	**15**	**32**	**2.7**	**15.8**	**2.4**	**1.4**	**.**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.

[2] Five locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.

[3] 1=best, 5=worst.

[4] 0=none; 9=80-90% shattering. Shattering occurred after harvest and thus, did not affect yield results.

Table 18. Seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 2 (primarily maturity group II) evaluated in 1999. Individual values are the average of 3 locations (one replication per location) and reported as LSMeans from the GLM procedure of SAS [1].

				Fatty Acid Composition [2] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [3]
		%							
1	9254	21.2	43.7	10.0	5.0	24.9	53.1	7.0	15.0
2	IA2021	22.4	40.6	10.6	4.9	22.2	55.6	6.9	15.4
3	SAVOY	20.2	45.3	9.8	4.8	25.0	53.4	7.1	14.6
4	PI593959	21.1	40.4	11.3	5.4	24.6	51.3	7.5	16.7
5	PI594304A	18.9	44.5	10.0	4.5	23.2	54.5	7.7	14.5
6	PI068508	21.6	41.0	10.5	5.0	24.5	53.4	6.7	15.4
7	PI068600	18.7	46.1	10.4	4.1	19.8	57.4	8.4	14.5
8	PI068658	21.0	42.8	11.0	4.7	23.0	53.7	7.7	15.7
9	PI070463	21.4	42.3	10.3	5.2	27.3	50.6	6.6	15.5
10	PI088798	18.8	44.4	10.6	5.1	26.7	50.9	6.7	15.7
11	PI091091	19.8	43.8	10.8	4.6	24.3	53.2	7.2	15.3
12	PI091167	20.1	42.9	10.7	4.3	21.5	55.3	8.2	15.0
13	PI189930	19.9	43.0	10.5	4.1	21.6	55.8	7.9	14.6
14	PI227333	20.0	42.9	10.5	4.2	22.3	55.3	7.7	14.7
15	PI253653D	21.5	41.4	10.5	5.0	24.0	53.3	7.4	15.4
16	PI261474	20.0	43.1	10.5	4.2	21.7	56.2	7.5	14.7
17	PI290126B	19.4	45.0	10.9	4.3	24.2	53.5	7.1	15.1
18	PI297505	20.7	42.1	9.9	5.5	28.3	49.6	6.7	15.4
19	PI297515	21.1	42.1	11.0	4.4	22.8	54.0	7.8	15.3
20	PI297544	19.7	43.6	10.5	4.1	21.4	56.0	8.0	14.6
21	PI361064	18.8	42.0	11.9	5.2	24.8	51.2	7.0	17.1
22	PI383277	19.8	42.5	11.4	5.0	22.3	53.5	7.8	16.4
23	PI407720	20.3	41.9	10.0	4.4	23.5	54.1	8.1	14.4
24	PI424201	20.5	42.1	10.3	4.4	24.7	53.7	6.9	14.7
25	PI437640A	18.3	44.7	11.0	4.3	22.4	54.8	7.5	15.3
26	PI437697	20.2	43.4	10.5	4.6	22.6	55.0	7.5	15.0
27	PI437863A	19.4	44.0	11.1	4.7	22.1	54.4	7.8	15.7
28[3]	PI438085	21.5	40.8	11.0	4.7	23.9	52.6	7.8	15.7
29[3]	PI503338	19.8	43.8	12.1	6.0	28.0	47.0	6.8	18.1
30[3]	PI437437B	20.3	44.4	9.8	5.4	25.0	52.0	7.7	15.2
	LSMEAN	20.2	43.0	10.6	4.7	23.7	53.5	7.4	15.3

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[3] Total of saturated fatty acids (16:0 + 18:0).
[4] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 2

(Primarily maturity group II)

INDIVIDUAL LOCATIONS IN 1999

Table 19. Yield (bu/a) of soybean accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Ames, IA	Cedar Falls, IA	Janesville, WI	Johnston, IA	Urbana, IL	West Lafayette IN	LSMean
1	**9254**	59.1	49.0	55.3	58.8	63.4	31.7	52.9
2	**IA2021**	56.2	50.4	53.8	52.9	50.9	34.1	49.7
3	**Savoy**	60.5	50.0	55.5	56.6	63.5	32.5	53.1
4	**PI593959**	.	37.0	43.1	45.5	42.5	26.5	38.9
5	**PI594304A**	28.2	23.6	48.2	48.1	35.0	19.4	33.8
6	**PI068508**	38.9	32.9	44.9	48.7	40.9	24.4	38.4
7	**PI068600**	35.2	32.9	38.7	34.5	37.9	22.7	33.6
8	**PI068658**	32.1	29.9	44.8	37.0	33.2	19.2	32.7
9	**PI070463**	39.1	35.5	50.4	30.0	40.5	23.4	36.5
10	**PI088798**	45.0	30.8	40.0	37.6	39.7	23.7	36.1
11	**PI091091**	52.3	30.3	50.5	43.3	48.2	24.4	41.5
12	**PI091167**	43.0	32.4	47.6	37.5	43.1	26.2	38.3
13	**PI189930**	41.9	29.8	55.8	31.3	43.0	21.5	37.2
14	**PI227333**	44.3	34.4	.	45.6	41.9	21.9	37.6
15	**PI253653D**	38.3	33.4	.	.	32.9	25.6	32.5
16	**PI261474**	.	27.3	39.6	37.9	45.3	20.4	34.1
17	**PI290126B**	40.9	36.0	41.2	36.1	39.7	26.1	36.6
18	**PI297505**	31.1	32.9	51.5	29.3	33.9	21.8	33.4
19	**PI297515**	44.7	31.9	47.9	39.0	37.1	24.4	37.5
20	**PI297544**	.	29.8	40.7	38.8	48.1	24.6	36.4
21	**PI361064**	53.1	31.9	.	37.8	40.2	27.8	38.1
22	**PI383277**	53.3	32.5	47.5	40.9	47.0	24.6	40.9
23	**PI407720**	39.9	34.5	45.1	37.5	49.0	28.1	39.0
24	**PI424201**	33.7	36.9	42.6	36.6	38.2	26.2	35.7
25	**PI437640A**	40.2	29.4	44.6	38.9	40.4	21.0	35.7
26	**PI437697**	42.3	38.7	43.5	41.4	41.7	20.5	38.0
27	**PI437863A**	37.6	34.0	46.0	30.3	42.6	22.9	35.6
28	**PI438085**	40.2	33.4	35.7	39.6	38.5	19.8	34.5
29	**PI503338**	33.9	38.6	40.3	39.0	44.5	29.2	37.6
30	**PI437437B**	31.1	33.4	41.3	33.1	42.7	23.8	34.2
	LSMean	**42.1**	**34.4**	**45.8**	**40.1**	**42.8**	**24.6**	**38.4**
	LSD(0.05) [2]	**10.2**	**5.7**	**7.4**	**10.0**	**5.5**	**4.9**	**3.0**
	CV (%)	**10**	**12**	**8**	**12**	**6**	**10**	**12**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

[2] A single LSD value is given for each location although LSMeans are presented. These LSD values closely approximate the individual pairwise LSD's obtained from the LSMean provided by SAS.

Table 20. Maturity Date (September 1 = 1) of soybean accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Ames, IA	Cedar Falls, IA	Janesville, WI	Johnston, IA	Urbana, IL	West Lafayette, IN	LSMean
1	9254	22	24	17	24	21	14	20
2	IA2021	21	21	14	22	16	10	17
3	Savoy	24	22	14	20	18	13	18
4	PI593959	21	19	19	19	14	8	16
5	PI594304A	22	19	15	24	17	10	18
6	PI068508	17	17	14	20	15	8	15
7	PI068600	13	15	11	18	11	6	12
8	PI068658	8	12	13	17	11	5	11
9	PI070463	20	20	15	20	17	10	17
10	PI088798	14	14	12	18	12	9	13
11	PI091091	25	21	19	23	17	9	19
12	PI091167	17	15	15	19	14	8	14
13	PI189930	23	17	16	19	13	10	16
14	PI227333	18	16	16	20	12	7	15
15	PI253653D	11	17	12	15	11	8	12
16	PI261474	16	17	14	18	12	5	14
17	PI290126B	17	16	14	18	12	7	14
18	PI297505	20	18	14	21	16	10	16
19	PI297515	13	16	12	20	13	7	13
20	PI297544	21	18	16	21	15	8	16
21	PI361064	25	25	21	28	25	19	24
22	PI383277	24	22	19	23	20	11	19
23	PI407720	20	16	17	22	18	10	17
24	PI424201	14	16	11	16	13	8	13
25	PI437640A	3	7	8	15	2	1	6
26	PI437697	18	19	15	21	14	8	16
27	PI437863A	18	19	15	20	17	12	16
28	PI438085	15	18	16	21	17	10	16
29	PI503338	21	18	13	21	13	9	16
30	PI437437B	18	17	11	20	17	9	15
	LSMean	18	18	15	20	15	9	15

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

Table 21. Plant Height (inches) of soybean accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Ames, IA	Cedar Falls, IA	Janesville, WI	Johnston, IA	Urbana, IL	West Lafayette, IN	LSMean
1	**9254**	32	35	40	36	33	25	33
2	**IA2021**	30	35	41	33	30	25	32
3	**Savoy**	27	33	36	33	31	26	31
4	**PI593959**	35	39	41	38	37	31	36
5	**PI594304A**	23	28	32	30	25	23	27
6	**PI068508**	25	31	33	28	30	26	29
7	**PI068600**	33	40	44	38	36	33	37
8	**PI068658**	23	30	36	31	32	28	30
9	**PI070463**	34	36	38	34	35	34	35
10	**PI088798**	26	31	36	29	28	25	29
11	**PI091091**	29	32	38	32	28	24	31
12	**PI091167**	25	32	40	32	29	28	31
13	**PI189930**	28	32	41	32	30	26	31
14	**PI227333**	26	33	40	30	28	26	30
15	**PI253653D**	26	33	36	30	31	29	31
16	**PI261474**	26	29	44	30	30	28	31
17	**PI290126B**	28	35	39	35	30	29	32
18	**PI297505**	36	36	37	36	34	31	35
19	**PI297515**	29	32	40	34	27	27	31
20	**PI297544**	25	31	40	29	33	27	31
21	**PI361064**	30	36	37	36	27	28	32
22	**PI383277**	41	41	45	39	38	31	39
23	**PI407720**	24	29	41	32	29	25	30
24	**PI424201**	21	25	32	27	28	27	27
25	**PI437640A**	28	32	41	33	34	24	32
26	**PI437697**	36	47	52	41	35	33	40
27	**PI437863A**	27	30	36	32	33	28	31
28	**PI438085**	36	36	42	37	34	35	36
29	**PI503338**	31	39	41	38	33	31	35
30	**PI437437B**	29	33	45	35	31	27	33
	LSMean	**29**	**34**	**39**	**33**	**31**	**28**	**32**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

Table 22. Plant Lodging score (1=erect, 5=prostrate) of soybean accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Ames, IA	Cedar Falls, IA	Janesville, WI	Johnston, IA	Urbana, IL	West Lafayette, IN	LSMean
1	**9254**	2.0	1.3	1.5	1.8	1.2	1.0	1.5
2	**IA2021**	2.5	3.0	2.8	2.3	1.5	1.3	2.2
3	**Savoy**	2.5	1.3	3.3	1.8	1.2	1.0	1.8
4	**PI593959**	3.0	2.8	4.5	2.8	2.3	1.5	2.8
5	**PI594304A**	2.0	2.0	2.8	2.5	1.0	1.0	1.9
6	**PI068508**	4.0	3.5	5.0	3.3	3.3	1.8	3.5
7	**PI068600**	3.8	4.0	4.5	2.5	2.8	2.0	3.3
8	**PI068658**	2.5	4.3	4.8	3.5	3.3	3.0	3.5
9	**PI070463**	4.0	3.8	4.5	3.0	2.3	2.0	3.3
10	**PI088798**	2.8	2.8	4.3	2.5	1.5	1.0	2.5
11	**PI091091**	4.0	3.5	3.8	3.0	2.3	1.0	2.9
12	**PI091167**	2.8	2.8	4.5	2.5	1.8	1.0	2.5
13	**PI189930**	3.5	2.8	4.5	3.0	2.0	1.0	2.8
14	**PI227333**	2.8	3.3	4.3	2.8	1.8	1.0	2.6
15	**PI253653D**	2.8	4.3	5.0	3.5	3.3	2.5	3.5
16	**PI261474**	2.8	2.8	4.3	3.0	2.0	1.0	2.6
17	**PI290126B**	3.0	3.0	4.5	3.0	1.5	1.3	2.7
18	**PI297505**	3.8	2.5	4.5	2.5	2.8	1.3	2.9
19	**PI297515**	2.8	3.3	4.3	2.8	2.0	1.0	2.7
20	**PI297544**	2.5	2.5	4.5	2.8	1.5	1.3	2.5
21	**PI361064**	4.0	3.0	4.0	2.8	2.0	1.0	2.8
22	**PI383277**	4.5	4.3	4.5	3.0	2.8	1.8	3.5
23	**PI407720**	2.0	3.0	4.5	3.0	2.3	1.0	2.6
24	**PI424201**	1.8	2.3	4.8	1.8	1.8	1.3	2.3
25	**PI437640A**	3.0	2.5	4.0	2.3	2.0	1.0	2.5
26	**PI437697**	3.5	4.0	4.5	3.0	2.8	1.5	3.2
27	**PI437863A**	2.3	2.5	4.3	2.5	2.3	1.5	2.5
28	**PI438085**	3.5	3.8	4.5	2.8	2.5	2.8	3.3
29	**PI503338**	2.8	2.5	3.0	3.0	2.0	1.0	2.4
30	**PI437437B**	4.0	4.0	4.5	3.0	2.3	1.5	3.2
	LSMean	**3.0**	**3.1**	**4.2**	**2.7**	**2.1**	**1.4**	**2.7**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

Table 23. Seed Weight (g/100 seed) of soybean accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Ames, IA	Cedar Falls, IA[2]	Janesville, WI[2]	Johnston, IA[2]	Urbana, IL	West Lafayette, IN	LSMean
1	**9254**	12.9	.	.	.	13.6	11.6	12.7
2	**IA2021**	15.4	.	.	.	14.8	13.1	14.4
3	**Savoy**	17.0	.	.	.	16.1	14.8	16.0
4	**PI593959**	20.4	.	.	.	17.0	13.9	17.1
5	**PI594304A**	27.7	.	.	.	22.0	21.6	23.8
6	**PI068508**	13.7	.	.	.	12.5	12.3	12.8
7	**PI068600**	13.6	.	.	.	12.7	13.0	13.1
8	**PI068658**	14.2	.	.	.	13.2	12.8	13.4
9	**PI070463**	17.4	.	.	.	16.6	15.5	16.5
10	**PI088798**	22.1	.	.	.	18.6	18.0	19.6
11	**PI091091**	18.4	.	.	.	16.9	13.9	16.4
12	**PI091167**	19.1	.	.	.	16.7	17.2	17.6
13	**PI189930**	18.8	.	.	.	16.7	16.0	17.2
14	**PI227333**	21.5	.	.	.	18.3	17.6	19.1
15	**PI253653D**	14.2	.	.	.	12.6	12.7	13.1
16	**PI261474**	21.6	.	.	.	18.5	16.8	18.9
17	**PI290126B**	18.7	.	.	.	17.7	15.0	17.1
18	**PI297505**	16.8	.	.	.	14.9	13.8	15.1
19	**PI297515**	15.8	.	.	.	13.0	13.3	14.0
20	**PI297544**	21.9	.	.	.	18.0	17.9	19.3
21	**PI361064**	12.7	.	.	.	12.7	12.1	12.5
22	**PI383277**	19.1	.	.	.	16.9	14.9	16.9
23	**PI407720**	18.5	.	.	.	16.9	15.6	17.0
24	**PI424201**	14.4	.	.	.	13.1	12.6	13.4
25	**PI437640A**	15.9	.	.	.	14.3	13.2	14.4
26	**PI437697**	16.3	.	.	.	13.3	12.1	13.9
27	**PI437863A**	16.0	.	.	.	14.6	14.0	14.9
28	**PI438085**	17.0	.	.	.	14.2	13.8	15.0
29	**PI503338**	15.2	.	.	.	15.6	12.7	14.5
30	**PI437437B**	17.4	.	.	.	15.3	14.2	15.6
	LSMean	**17.5**	.	.	.	**15.6**	**14.5**	**15.8**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 24. Seed Quality score (1=good, 5=poor) of soybean accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Ames, IA[2]	Cedar Falls, IA[2]	Janesville, WI[2]	Johnston, IA[2]	Urbana, IL	West Lafayette, IN[2]	LSMean
1	9254	.	.	.	.	2.5	.	2.5
2	IA2021	.	.	.	.	1.5	.	1.5
3	Savoy	.	.	.	.	2.5	.	2.5
4	PI593959	.	.	.	.	2.0	.	2.0
5	PI594304A	.	.	.	.	3.0	.	3.0
6	PI068508	.	.	.	.	2.3	.	2.3
7	PI068600	.	.	.	.	3.3	.	3.3
8	PI068658	.	.	.	.	2.8	.	2.8
9	PI070463	.	.	.	.	2.3	.	2.3
10	PI088798	.	.	.	.	2.5	.	2.5
11	PI091091	.	.	.	.	2.5	.	2.5
12	PI091167	.	.	.	.	2.5	.	2.5
13	PI189930	.	.	.	.	2.5	.	2.5
14	PI227333	.	.	.	.	3.0	.	3.0
15	PI253653D	.	.	.	.	3.0	.	3.0
16	PI261474	.	.	.	.	3.0	.	3.0
17	PI290126B	.	.	.	.	2.0	.	2.0
18	PI297505	.	.	.	.	2.5	.	2.5
19	PI297515	.	.	.	.	2.5	.	2.5
20	PI297544	.	.	.	.	2.5	.	2.5
21	PI361064	.	.	.	.	1.5	.	1.5
22	PI383277	.	.	.	.	2.0	.	2.0
23	PI407720	.	.	.	.	2.5	.	2.5
24	PI424201	.	.	.	.	2.0	.	2.0
25	PI437640A	.	.	.	.	1.8	.	1.8
26	PI437697	.	.	.	.	2.3	.	2.3
27	PI437863A	.	.	.	.	3.0	.	3.0
28	PI438085	.	.	.	.	2.3	.	2.3
29	PI503338	.	.	.	.	2.5	.	2.5
30	PI437437B	.	.	.	.	2.7	.	2.7
	LSMean					2.4		2.4

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 25. Shattering score (0= none, 9=81-90% of pods shattered) seed) of soybean accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1]. Shattering occurred after harvest and did not affect yield.

Code	Name	Ames, IA[2]	Cedar Falls, IA[2]	Janesville, WI[2]	Johnston, IA[2]	Urbana, IL	West Lafayette, IN[2]	LSMean
1	**9254**	.	.	.	.	1.0	.	1.0
2	**IA2021**	.	.	.	.	1.0	.	1.0
3	**Savoy**	.	.	.	.	1.0	.	1.0
4	**PI593959**	.	.	.	.	1.0	.	1.0
5	**PI594304A**	.	.	.	.	2.0	.	2.0
6	**PI068508**	.	.	.	.	1.0	.	1.0
7	**PI068600**	.	.	.	.	1.5	.	1.5
8	**PI068658**	.	.	.	.	2.5	.	2.5
9	**PI070463**	.	.	.	.	1.0	.	1.0
10	**PI088798**	.	.	.	.	1.0	.	1.0
11	**PI091091**	.	.	.	.	1.0	.	1.0
12	**PI091167**	.	.	.	.	1.5	.	1.5
13	**PI189930**	.	.	.	.	1.5	.	1.5
14	**PI227333**	.	.	.	.	1.5	.	1.5
15	**PI253653D**	.	.	.	.	1.5	.	1.5
16	**PI261474**	.	.	.	.	1.5	.	1.5
17	**PI290126B**	.	.	.	.	1.0	.	1.0
18	**PI297505**	.	.	.	.	2.0	.	2.0
19	**PI297515**	.	.	.	.	2.0	.	2.0
20	**PI297544**	.	.	.	.	1.5	.	1.5
21	**PI361064**	.	.	.	.	1.0	.	1.0
22	**PI383277**	.	.	.	.	2.0	.	2.0
23	**PI407720**	.	.	.	.	1.0	.	1.0
24	**PI424201**	.	.	.	.	1.5	.	1.5
25	**PI437640A**	.	.	.	.	2.0	.	2.0
26	**PI437697**	.	.	.	.	1.0	.	1.0
27	**PI437863A**	.	.	.	.	1.0	.	1.0
28	**PI438085**	.	.	.	.	1.0	.	1.0
29	**PI503338**	.	.	.	.	1.0	.	1.0
30	**PI437437B**	.	.	.	.	1.5	.	1.5
	LSMean					1.4		1.4

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

TEST 2

COMBINED RESULTS FOR 1998 AND 1999

Table 26. Two-year summary for yield of soybean accessions in SAGE Test 2 (primarily maturity group II) evaluated in 1998 and 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	MG [2]	Yield (bu/ac)			Yield as Percent of Appropriate Maturity Check(s) [4]		
			1998	1999	'98/'99 [3]	1998	1999	'98/'99 [3]
1	9254	II	56.3	52.9	54.6			
2	IA2021	II	51.3	49.7	50.5		%	
3	Savoy	II	53.6	53.1	53.4			
4	PI593959	II	43.0	38.9	41.0	80	75	78
5	PI594304A	I	41.6	33.8	37.7	77	65	71
6	PI068508	II	39.5	38.4	39.0	74	74	74
7	PI068600	II	39.9	33.6	36.8	74	65	70
8	PI068658	II	37.9	32.7	35.3	71	63	67
9	PI070463	II	38.9	36.5	37.7	72	70	71
10	PI088798	II	39.0	36.1	37.6	73	70	71
11	PI091091	II	40.9	41.5	41.2	76	80	78
12	PI091167	II	42.8	38.3	40.6	80	74	77
13	PI189930	II	39.6	37.2	38.4	74	72	73
14	PI227333	II	41.4	37.6	39.5	77	72	75
15	PI253653D	I	36.1	32.5	34.3	67	63	65
16	PI261474	II	44.6	34.1	39.4	83	66	75
17	PI290126B	II	43.0	36.6	39.8	80	71	75
18	PI297505	I	40.0	33.4	36.7	74	64	69
19	PI297515	II	44.9	37.5	41.2	84	72	78
20	PI297544	II	41.0	36.4	38.7	76	70	73
21	PI361064	II	42.0	38.1	40.1	78	74	76
22	PI383277	II	42.6	40.9	41.8	79	79	79
23	PI407720	II	40.6	39.0	39.8	76	75	75
24	PI424201	II	39.0	35.7	37.4	73	69	71
25	PI437640A	I	38.4	35.7	37.1	NR[5]	NR[5]	NR[5]
26	PI437697	II	42.7	38.0	40.4	79	73	76
27	PI437863A	II	44.2	35.6	39.9	82	69	76
28	PI438085	II	41.1	34.5	37.8	76	66	72
29	PI503338	II	44.0	37.6	40.8	82	72	77
30[6]	PI437437B	II	.	34.2	.	.	66	.
	LSMean		42.4	38.0	40.3	77	70	74

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] Maturity group assigned by USDA Soybean Germplasm Collection.
[3] Yield averaged over 1998 and 1999.
[4] Yield as Percent of Check(s) was calculated by dividing accession yield by the yield of the appropriate check (or checks averaged together).
[5] Not Rated due to early maturity- no checks to compare against.
[6] This accessions was only evaluated in 1999.

Table 27. Two-year summary (1998 and 1999) of overall agronomic performance of Asian soybean varieties in the SAGE Test 2 (primarily maturity group II). Means are presented as LSMeans from the GLM procedure of SAS [1]. Only traits that were recorded in both years are reported here.

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)	Seed Quality (1 to 5) [3]
1	**9254**	54.6	17	32	1.4	12.9	2.4
2	**IA2021**	50.5	15	31	2.2	15.0	1.8
3	**Savoy**	53.4	17	31	1.8	16.1	2.2
4	**PI593959**	41.0	16	38	2.9	18.0	2.0
5	**PI594304A**	37.7	17	28	1.9	25.9	2.9
6	**PI068508**	39.0	15	31	3.5	13.7	2.1
7	**PI068600**	36.8	13	37	3.3	13.8	2.7
8	**PI068658**	35.3	12	31	3.4	14.3	2.3
9	**PI070463**	37.7	17	35	3.3	17.2	2.3
10	**PI088798**	37.6	13	30	2.4	21.8	2.4
11	**PI091091**	41.2	20	32	2.7	16.8	2.2
12	**PI091167**	40.6	14	33	2.6	19.4	2.4
13	**PI189930**	38.4	15	33	2.8	19.0	2.5
14	**PI227333**	39.5	15	32	2.6	20.6	2.8
15	**PI253653D**	34.3	13	31	3.3	14.1	2.6
16	**PI261474**	39.4	14	32	2.7	20.9	2.6
17	**PI290126B**	39.8	15	33	2.6	18.7	2.0
18	**PI297505**	36.7	16	36	2.9	15.7	2.2
19	**PI297515**	41.2	13	32	2.7	15.8	2.2
20	**PI297544**	38.7	16	32	2.5	20.8	2.5
21	**PI361064**	40.1	21	34	2.8	11.9	1.6
22	**PI383277**	41.8	18	39	3.4	17.4	2.1
23	**PI407720**	39.8	16	30	2.8	17.9	2.4
24	**PI424201**	37.4	14	28	2.5	14.2	1.8
25	**PI437640A**	37.1	8	33	2.6	15.7	1.8
26	**PI437697**	40.4	16	41	3.2	14.5	2.6
27	**PI437863A**	39.9	17	33	2.7	15.4	2.6
28	**PI438085**	37.8	16	38	3.3	15.8	2.4
29	**PI503338**	40.8	16	36	2.5	15.2	2.3
30[4]	**PI437437B**	.	.	.	.	.	.
	LSMean	**40.3**	**15**	**33**	**2.7**	**16.8**	**2.3**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.

[2] Five locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.

[3] 1=best, 5=worst.

[4] This accession was only tested in 1998.

Table 28. Two-year summary (1998 and 1999) of seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 2 (primarily maturity group II). Only accessions tested in both years have values reported here.

				Fatty Acid Composition [1] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [2]
		%							
1	9254	21.6	42.3	10.3	4.6	24.8	53.3	7.1	14.9
2	IA2021	21.8	41.0	10.7	4.6	22.2	55.7	7.0	15.2
3	SAVOY	20.5	43.9	10.1	4.4	24.9	53.5	7.3	14.4
4	PI593959	20.7	40.9	11.3	4.9	24.6	51.8	7.7	16.1
5	PI594304A	19.0	43.7	10.2	4.1	26.6	52.0	7.2	14.3
6	PI068508	21.2	41.1	10.5	4.7	24.6	53.5	6.9	15.1
7	PI068600	18.1	46.0	10.1	3.9	21.2	57.0	8.0	14.0
8	PI068658	20.8	42.9	10.8	4.2	24.7	53.1	7.4	15.0
9	PI070463	21.4	42.5	10.2	4.7	29.4	49.5	6.4	14.9
10	PI088798	19.4	43.8	10.5	4.9	28.7	49.6	6.5	15.4
11	PI091091	20.2	43.1	10.8	4.3	24.7	52.9	7.4	15.0
12	PI091167	20.4	42.8	10.7	4.0	23.6	54.1	7.7	14.7
13	PI189930	20.3	42.4	10.5	4.1	23.3	54.6	7.7	14.5
14	PI227333	20.7	42.7	10.4	4.0	24.5	53.8	7.4	14.4
15	PI253653D	20.9	42.3	10.3	4.6	23.7	54.3	7.4	14.8
16	PI261474	20.5	43.0	10.4	4.0	24.7	54.0	7.0	14.4
17	PI290126B	20.0	44.5	10.8	4.1	26.9	51.6	6.8	14.7
18	PI297505	20.5	42.0	10.1	4.8	28.8	49.7	6.7	14.9
19	PI297515	21.1	42.4	10.9	4.2	23.7	53.7	7.6	15.1
20	PI297544	20.4	43.1	10.4	4.0	23.2	55.0	7.5	14.4
21	PI361064	18.6	40.8	11.9	4.8	24.4	51.8	7.3	16.7
22	PI383277	20.2	42.1	11.3	5.0	25.2	51.2	7.3	16.3
23	PI407720	20.4	41.8	10.3	4.2	24.1	53.6	8.0	14.5
24	PI424201	20.1	42.7	9.9	4.2	27.8	51.6	6.7	14.0
25	PI437640A	18.9	44.2	11.1	4.1	23.6	53.6	7.7	15.2
26	PI437697	20.2	41.9	10.4	4.5	23.8	54.4	7.1	14.7
27	PI437863A	19.6	43.3	11.2	4.4	23.1	53.8	7.6	15.5
28	PI438085	21.2	41.7	11.1	4.4	25.1	52.0	7.6	15.4
29	PI503338	19.9	43.4	11.6	5.6	30.8	45.6	6.5	17.2
30[3]	PI437437B	.	.	.	.	.	.	.	.
	LSMEAN	20.3	42.7	10.6	4.4	25.0	52.7	7.2	15.0

[1] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[2] Total of saturated fatty acids (16:0 + 18:0).
[3] This accession was added to the study in 1999.
[4] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 3

(Primarily maturity group III and IV)

SUMMARY ACROSS LOCATIONS IN 1999

Table 29. Morphological characteristics and origin of accessions in SAGE Test 3 (primarily maturity groups III and IV) evaluated in 1999.

Code	PI Number	Accession Name	Origin	Flower Color[1]	Pubescence Color[2]	Stem Termin.[3]	Podwall Color[4]	Hilum Color[5]	Seed Coat Color[6]	Maturity Group[7]
6	PI574477	Fen dou No. 31	China	W	T	N	Br	Br	Y	IV
7	PI592936	Ji dou No. 7	China	P	G	D	Tn	Y	Y	II
8	PI592946	Ji dou No. 4	China	P	T	N	Br	Br-Ib	Y	IV
9	PI592947	Jin yi No. 9	China	P	G	D	Br	Ib	Y	IV
10	FC004007B		Unknown	P	T	N	Br	Y	Y	III
11	FC029333	Laredo	Unknown	W	G	N	Br	Bf	Y	III
12	PI068560		China	W	G	N	Dbr	Y	Y	III
13	PI086114	Hoten Kuroheso	Japan	W	T	N	Br	Bl	Y	III
14	PI086456	Kakukwazoshi	Japan	W	G	N	Dbr	Lbf	Y	III
15	PI088306		China	W	G	D	Br	Lbf	Y	III
16	PI088310		China	W	G	D	Br	Lbf	Y	III
17	PI088350	Kaiyuan	China	W	G	N	Dbr	Y	Y	III
18	PI088447		China	P	G	N	Br	Y	Y	III
19	PI090566-1		China	W	G	N	Tn	Bf	Y	III
20	PI091113		China	W	G	N	Dbr	Bf	Y	III
21	PI091142		China	W	G	N	Br	Lbf	Y	III
22	PI091730-1		China	W	G	N	Br	Y	Y	III
23	PI153309	Bergerac	France	W	G	N	Br	Bf	Y	III
24	PI227328	Manchikin	Japan	W	G	N	Br	Lbf	Y	III
25	PI248402	Manhatten	United States	P	G	N	Br	Ib	Y	IV
26	PI253665D		China	W	G	N	Br	Lbf	Y	III
27	PI283331	No. 380	Morocco	P	T	N	Br	Y	Y	III
28	PI398881		Korea, South	P	T	N	Br	Bl	Y	III
29	PI404161	Mocinabe 7	Russia	W	G	N	Tn	Bf	Y	IV
30	PI415074	Tie feng 19A	China	W	G	N	Tn	Y	Y	III
31	PI424405B		Korea, South	P	T	N	Br	Bl	Y	IV
32	PI507295	Shoutou 1 (Chou)	Japan	W	G	D	Br	Lbf	Y	III
33	PI084656		Korea, South	P	G	N	Br	Ib	Y	III
34	PI092718-2		China	P	G	N	Br	Bf	Y	III
35	PI167240		Turkey	W	G	N	Dbr	Y	Y	III
36	PI437863B		China	W	G	N	Dbr	Y	Y	III

[1] P= Purple, W= White, Dp= Dark purple.
[2] G= Gray, T= Tawny.
[3] D= Determinate, N= Indeterminate.
[4] Br= Brown, Tn= Tan, Dbr= Dark Brown.
[5] Y= Yellow, Bf= Buff, Lbf= Light buff, Ibl= Imperfect Black, Br= Brown, Br-Ib = Brown to Imperfect Black.
[6] Y= Yellow, Lg= Light green.
[7] Maturity group assigned by USDA Soybean Germplasm Collection.

Table 30. Overall agronomic performance of Asian soybean varieties in the SAGE Test 3 (primarily maturity groups III and IV) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)
1	**9352**	53.2	30	33	1.6	15.8
2	**9421**	53.7	31	39	2.1	16.4
3	**Cisne**	51.0	33	34	1.9	19.9
4	**Iroquois**	50.7	25	36	1.6	15.5
5	**Macon**	50.0	31	34	1.8	16.0
6	**PI574477**	42.9	32	37	2.8	17.8
7	**PI592936**	32.4	21	29	1.8	17.9
8	**PI592946**	35.3	28	32	2.0	20.5
9	**PI592947**	40.2	35	32	1.9	15.9
10	**FC004007B**	34.4	21	32	2.9	13.7
11	**FC029333**	38.7	23	41	3.7	14.8
12	**PI068560**	34.9	20	34	3.3	18.9
13	**PI086114**	28.8	21	39	4.2	16.7
14	**PI086456**	29.9	21	34	2.9	19.3
15	**PI088306**	40.0	25	23	2.8	25.6
16	**PI088310**	40.7	23	23	2.8	21.2
17	**PI088350**	32.7	19	36	3.4	19.3
18	**PI088447**	35.3	26	32	3.6	20.2
19	**PI090566-1**	30.2	18	30	3.6	13.7
20	**PI091113**	37.6	21	34	3.5	14.5
21	**PI091142**	41.0	25	37	3.0	16.9
22	**PI091730-1**	36.6	28	33	3.8	18.9
23	**PI153309**	37.6	23	42	3.8	13.8
24	**PI227328**	34.1	24	32	3.1	20.7
25	**PI248402**	38.3	34	37	1.8	17.8
26	**PI253665D**	34.4	21	30	2.1	19.5
27	**PI283331**	35.4	31	38	3.7	17.4
28	**PI398881**	40.4	23	40	2.3	17.4
29	**PI404161**	32.0	38	30	3.1	19.1
30	**PI415074**	37.0	22	32	2.6	18.9
31	**PI424405B**	40.4	30	36	2.8	17.3
32	**PI507295**	38.0	22	22	2.1	14.5
33	**PI084656**	34.8	28	37	2.9	19.9
34	**PI092718-2**	32.3	22	39	4.6	19.0
35	**PI167240**	30.9	19	39	2.9	19.8
36	**PI437863B**	31.8	19	33	3.2	18.4
	LSMEAN	**38.0**	**25**	**34**	**2.8**	**17.9**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.

[2] Four locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.

[3] 1=best, 5=worst.

Table 31. Seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 3 (primarily maturity group III and IV) evaluated in 1999. Individual values are the average of 3 locations (one replication per location) and reported as LSMeans from the GLM procedure of SAS [1].

				Fatty Acid Composition [2] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [3]
		%							
1	9352	22.9	40.0	9.9	4.1	25.7	53.6	6.7	14.0
2	9421	21.5	42.1	10.6	4.2	24.0	54.5	6.8	14.8
3	CISNE	21.5	43.2	9.8	5.2	25.7	52.4	7.0	15.0
4	IROQUOIS	22.1	40.6	11.1	4.3	23.1	54.7	6.9	15.3
5	MACON	22.0	39.6	10.8	4.4	22.9	54.5	7.5	15.2
6	PI574477	22.0	41.8	9.6	4.0	23.4	56.3	6.8	13.5
7	PI592936	21.2	42.6	11.3	4.2	28.6	49.7	6.3	15.5
8	PI592946	21.9	43.3	11.1	4.6	23.2	54.6	6.7	15.7
9	PI592947	20.8	41.1	10.4	4.6	27.8	51.4	5.9	15.0
10	FC004007B	20.5	42.4	10.1	4.2	26.3	51.8	7.6	14.3
11	FC029333	21.4	42.0	10.7	4.3	23.3	54.2	7.5	15.0
12	PI068560	23.1	40.5	10.3	4.3	26.9	52.1	6.6	14.5
13	PI086114	22.1	40.9	9.9	4.5	31.7	48.1	5.9	14.3
14	PI086456	23.1	40.4	10.0	4.2	28.1	51.5	6.3	14.2
15	PI088306	21.7	42.5	11.5	4.6	29.2	48.2	6.5	16.1
16	PI088310	21.9	42.0	11.5	4.5	26.3	51.1	6.7	16.0
17	PI088350	23.0	40.5	10.2	4.2	26.6	52.9	6.1	14.4
18	PI088447	21.1	41.3	10.7	4.1	24.3	53.0	8.0	14.8
19	PI090566-1	23.0	39.1	11.1	4.6	25.8	52.3	6.3	15.7
20	PI091113	22.8	38.4	11.2	4.0	29.5	48.9	6.4	15.2
21	PI091142	21.4	39.8	10.6	4.2	21.4	56.0	8.0	14.7
22	PI091730-1	20.1	43.6	11.1	4.2	23.7	53.1	8.0	15.3
23	PI153309	21.9	40.9	11.0	4.1	23.2	54.5	7.3	15.1
24	PI227328	20.4	42.8	11.1	3.9	25.4	52.4	7.3	14.9
25	PI248402	22.2	41.3	10.4	4.8	23.9	54.1	7.0	15.2
26	PI253665D	21.7	41.6	10.7	4.8	28.5	49.9	6.2	15.5
27	PI283331	20.1	44.0	10.4	4.4	28.1	50.2	6.9	14.8
28	PI398881	22.1	42.0	10.6	4.8	23.6	54.2	7.0	15.4
29	PI404161	20.9	40.7	10.4	4.1	27.7	50.8	7.1	14.5
30	PI415074	21.1	41.2	10.0	4.1	26.1	53.5	6.4	14.0
31	PI424405B	21.4	42.2	10.2	4.6	22.6	55.8	6.9	14.8
32	PI507295	22.9	39.7	11.6	4.5	23.4	53.4	7.2	16.1
33	PI084656	22.4	42.0	9.7	4.2	29.1	50.6	6.5	13.9
34	PI092718-2	21.8	42.0	11.9	4.1	25.6	51.8	6.6	16.0
35	PI167240	23.0	40.5	10.2	4.1	26.6	52.8	6.3	14.3
36	PI437863B	22.6	40.7	10.2	4.0	26.2	53.2	6.6	14.1
	LSMEAN	21.8	41.3	10.6	4.3	25.7	52.5	6.8	14.9

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[3] Total of saturated fatty acids (16:0 + 18:0).
[4] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 3

(Primarily maturity group III and IV)

INDIVIDUAL LOCATIONS IN 1999

Table 32. Yield (bu/a) of soybean accessions in SAGE Test 3 (primarily maturity groups III and IV) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Hamel, IL	Queenstown, MD	St. Joseph, IL	Stonnington, IL	LSMean
1	9352	45.3	58.5	42.6	66.3	53.2
2	9421	48.5	59.5	43.1	64.0	53.7
3	Cisne	44.3	59.0	42.4	58.2	51.0
4	Iroquois	48.6	53.5	40.5	60.2	50.7
5	Macon	47.9	55.0	35.2	62.1	50.0
6	PI574477	41.4	46.5	30.3	53.6	42.9
7	PI592936	27.3	.	30.2	39.6	32.4
8	PI592946	30.6	39.0	29.4	42.3	35.3
9	PI592947	39.3	48.5	23.3	49.9	40.2
10	FC004007B	25.2	39.0	29.5	44.0	34.4
11	FC029333	44.3	44.5	28.2	37.7	38.7
12	PI068560	30.1	36.0	30.4	43.1	34.9
13	PI086114	27.4	39.0	17.8	30.9	28.8
14	PI086456	19.0	36.0	26.9	37.8	29.9
15	PI088306	48.5	36.0	32.0	43.8	40.0
16	PI088310	44.2	42.5	30.9	45.1	40.7
17	PI088350	26.4	39.5	24.9	40.0	32.7
18	PI088447	30.3	42.5	21.5	46.9	35.3
19	PI090566-1	28.2	35.0	26.7	31.1	30.2
20	PI091113	32.6	39.0	34.3	44.5	37.6
21	PI091142	41.2	45.0	27.2	50.8	41.0
22	PI091730-1	34.8	45.5	25.1	41.1	36.6
23	PI153309	40.5	43.5	26.1	40.4	37.6
24	PI227328	28.6	48.0	17.9	41.9	34.1
25	PI248402	34.5	47.0	29.9	41.8	38.3
26	PI253665D	30.2	35.0	30.6	41.9	34.4
27	PI283331	36.3	42.5	21.8	41.1	35.4
28	PI398881	38.7	43.0	30.1	49.8	40.4
29	PI404161	22.5	45.5	15.1	44.8	32.0
30	PI415074	34.7	43.0	28.9	41.3	37.0
31	PI424405B	43.4	45.5	27.7	44.9	40.4
32	PI507295	31.7	44.0	30.0	46.3	38.0
33	PI084656	27.9	43.0	27.3	40.9	34.8
34	PI092718-2	32.5	37.5	25.8	33.3	32.3
35	PI167240	16.4	34.5	31.4	41.4	30.9
36	PI437863B	25.9	33.5	28.9	38.7	31.8
	LSMean	**34.7**	**43.6**	**29.0**	**45.0**	**38.1**
	LSD(0.05) 2]	**9.0**	**8.4**	**6.8**	**4.8**	**3.6**
	CV (%)	**13**	**9**	**11**	**5**	**10**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

[2] A single LSD value is given for each location although LSMeans are presented. These LSD values closely approximate the individual pairwise LSD's obtained from the LSMean provided by SAS.

Table 33. Maturity Date (September 1 = 1) of soybean accessions in SAGE Test 3 (primarily maturity groups III and IV) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Hamel, IL	Queenstown, MD	St. Joseph, IL	Stonnington, IL	LSMean
1	**9352**	26	33	27	35	30
2	**9421**	26	35	29	34	31
3	**Cisne**	28	37	30	36	33
4	**Iroquois**	20	26	21	31	25
5	**Macon**	26	33	29	35	31
6	**PI574477**	26	33	35	35	32
7	**PI592936**	13	24	17	29	21
8	**PI592946**	22	31	27	32	28
9	**PI592947**	29	35	38	37	35
10	**FC004007B**	12	27	17	29	21
11	**FC029333**	15	26	19	33	23
12	**PI068560**	11	24	15	31	20
13	**PI086114**	17	25	22	.	21
14	**PI086456**	11	23	15	33	21
15	**PI088306**	18	27	20	33	25
16	**PI088310**	16	23	20	32	23
17	**PI088350**	7	24	14	31	19
18	**PI088447**	17	29	24	33	26
19	**PI090566-1**	7	22	13	28	18
20	**PI091113**	12	23	16	34	21
21	**PI091142**	18	26	24	32	25
22	**PI091730-1**	19	31	27	33	28
23	**PI153309**	17	23	18	32	23
24	**PI227328**	15	27	20	34	24
25	**PI248402**	28	35	35	36	34
26	**PI253665D**	13	25	15	31	21
27	**PI283331**	25	33	29	37	31
28	**PI398881**	17	25	20	28	23
29	**PI404161**	31	41	41	.	38
30	**PI415074**	15	27	18	29	22
31	**PI424405B**	26	35	29	.	30
32	**PI507295**	16	25	20	28	22
33	**PI084656**	19	32	27	35	28
34	**PI092718-2**	15	23	16	32	22
35	**PI167240**	7	24	14	32	19
36	**PI437863B**	11	23	14	29	19
	LSMean	**19**	**28**	**23**	**33**	**25**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

Table 34. Plant Height (inches) of soybean accessions in SAGE Test 3 (primarily maturity groups III and IV) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Hamel, IL [2]	Queenstown, MD	St. Joseph, IL	Stonnington, IL [2]	LSMean
1	9352	.	27	40	.	33
2	9421	.	34	45	.	39
3	Cisne	.	30	39	.	34
4	Iroquois	.	30	42	.	36
5	Macon	.	28	41	.	34
6	PI574477	.	27	46	.	37
7	PI592936	.	25	33	.	29
8	PI592946	.	25	38	.	32
9	PI592947	.	27	37	.	32
10	FC004007B	.	28	36	.	32
11	FC029333	.	34	48	.	41
12	PI068560	.	28	40	.	34
13	PI086114	.	35	43	.	39
14	PI086456	.	32	36	.	34
15	PI088306	.	20	27	.	23
16	PI088310	.	21	26	.	23
17	PI088350	.	33	40	.	36
18	PI088447	.	31	32	.	32
19	PI090566-1	.	24	37	.	30
20	PI091113	.	32	37	.	34
21	PI091142	.	30	44	.	37
22	PI091730-1	.	31	35	.	33
23	PI153309	.	36	48	.	42
24	PI227328	.	30	34	.	32
25	PI248402	.	29	45	.	37
26	PI253665D	.	23	37	.	30
27	PI283331	.	34	43	.	38
28	PI398881	.	32	48	.	40
29	PI404161	.	28	33	.	30
30	PI415074	.	24	41	.	32
31	PI424405B	.	31	42	.	36
32	PI507295	.	20	24	.	22
33	PI084656	.	32	42	.	37
34	PI092718-2	.	34	44	.	39
35	PI167240	.	29	49	.	39
36	PI437863B	.	28	37	.	33
	LSMean		**29**	**39**	.	**34**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 35. Plant Lodging score (1=erect, 5=prostrate) of soybean accessions in SAGE Test 3 (primarily maturity groups III and IV) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Hamel, IL [2]	Queenstown, MD	St. Joseph, IL	Stonnington, IL	LSMean
1	**9352**	.	2.3	1.0	1.5	1.6
2	**9421**	.	2.8	1.5	2.0	2.1
3	**Cisne**	.	2.8	1.5	1.5	1.9
4	**Iroquois**	.	2.3	1.0	1.5	1.6
5	**Macon**	.	2.3	1.2	2.0	1.8
6	**PI574477**	.	2.8	2.8	3.0	2.8
7	**PI592936**	.	2.3	1.5	1.5	1.8
8	**PI592946**	.	1.8	1.3	3.0	2.0
9	**PI592947**	.	2.8	1.5	1.5	1.9
10	**FC004007B**	.	2.5	2.3	4.0	2.9
11	**FC029333**	.	3.5	4.0	3.5	3.7
12	**PI068560**	.	2.8	3.3	4.0	3.3
13	**PI086114**	.	3.3	3.3	6.0	4.2
14	**PI086456**	.	2.8	3.0	3.0	2.9
15	**PI088306**	.	2.5	2.5	3.5	2.8
16	**PI088310**	.	2.5	2.0	4.0	2.8
17	**PI088350**	.	3.0	3.8	3.5	3.4
18	**PI088447**	.	3.5	3.8	3.5	3.6
19	**PI090566-1**	.	3.5	2.3	5.0	3.6
20	**PI091113**	.	3.5	3.5	3.5	3.5
21	**PI091142**	.	3.3	2.8	3.0	3.0
22	**PI091730-1**	.	3.5	3.5	4.5	3.8
23	**PI153309**	.	3.5	3.5	4.5	3.8
24	**PI227328**	.	2.8	3.5	3.0	3.1
25	**PI248402**	.	2.0	1.5	2.0	1.8
26	**PI253665D**	.	1.8	2.0	2.5	2.1
27	**PI283331**	.	4.0	3.5	3.5	3.7
28	**PI398881**	.	3.0	1.8	2.0	2.3
29	**PI404161**	.	3.3	2.5	3.5	3.1
30	**PI415074**	.	2.5	2.3	3.0	2.6
31	**PI424405B**	.	3.0	2.0	3.5	2.8
32	**PI507295**	.	2.0	1.8	2.5	2.1
33	**PI084656**	.	3.0	2.8	3.0	2.9
34	**PI092718-2**	.	4.3	4.5	5.0	4.6
35	**PI167240**	.	2.5	2.8	3.5	2.9
36	**PI437863B**	.	2.7	3.5	3.5	3.2
	LSMean		**2.8**	**2.5**	**3.1**	**2.8**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 36. Seed Weight (g/100 seed) of soybean accessions in SAGE Test 3 (primarily maturity groups III and IV) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Hamel, IL [2]	Queenstown, MD	St. Joseph, IL [2]	Stonnington, IL [2]	LSMean
1	9352	.	15.8	.	.	15.8
2	9421	.	16.4	.	.	16.4
3	Cisne	.	19.9	.	.	19.9
4	Iroquois	.	15.5	.	.	15.5
5	Macon	.	16.0	.	.	16.0
6	PI574477	.	17.8	.	.	17.8
7	PI592936	.	17.9	.	.	17.9
8	PI592946	.	20.5	.	.	20.5
9	PI592947	.	15.9	.	.	15.9
10	FC004007B	.	13.7	.	.	13.7
11	FC029333	.	14.8	.	.	14.8
12	PI068560	.	18.9	.	.	18.9
13	PI086114	.	16.7	.	.	16.7
14	PI086456	.	19.3	.	.	19.3
15	PI088306	.	25.6	.	.	25.6
16	PI088310	.	21.2	.	.	21.2
17	PI088350	.	19.3	.	.	19.3
18	PI088447	.	20.2	.	.	20.2
19	PI090566-1	.	13.7	.	.	13.7
20	PI091113	.	14.5	.	.	14.5
21	PI091142	.	16.9	.	.	16.9
22	PI091730-1	.	18.9	.	.	18.9
23	PI153309	.	13.8	.	.	13.8
24	PI227328	.	20.7	.	.	20.7
25	PI248402	.	17.8	.	.	17.8
26	PI253665D	.	19.5	.	.	19.5
27	PI283331	.	17.4	.	.	17.4
28	PI398881	.	17.4	.	.	17.4
29	PI404161	.	19.1	.	.	19.1
30	PI415074	.	18.9	.	.	18.9
31	PI424405B	.	17.3	.	.	17.3
32	PI507295	.	14.5	.	.	14.5
33	PI084656	.	19.9	.	.	19.9
34	PI092718-2	.	19.0	.	.	19.0
35	PI167240	.	19.8	.	.	19.8
36	PI437863B	.	18.4	.	.	18.4
	LSMean	.	**17.8**	.	.	**17.8**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

TEST 3

COMBINED RESULTS FOR 1998 AND 1999

Table 37. Two-year summary for yield of soybean accessions in SAGE Test 3 (primarily maturity groups III and IV) evaluated in 1998 and 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	MG [2]	Yield (bu/ac)			Yield as Percent of Appropriate — Maturity Check(s) [4]		
			1998	1999	'98/'99 [3]	1998	1999	'98/'99 [3]
1	9352		49.7	53.2	51.5			
2	9421		54.4	53.7	54.1		%	
3	Cisne		53.1	51.0	52.1			
4	Iroquois		48.3	50.7	49.5			
5	Macon		51.9	50.0	51.0			
6	PI574477	IV	36.8	42.9	39.9	72	83	78
7	PI592936	III	40.7	32.4	36.6	79	63	71
8	PI592946	IV	38.7	35.3	37.0	75	68	72
9	PI592947	IV	41.6	40.2	40.9	81	78	79
10	FC004007B	III	30.9	34.4	32.7	60	67	63
11	FC029333	III	37.8	38.7	38.3	73	75	74
12	PI068560	III	38.5	34.9	36.7	75	68	71
13	PI086114	III	27.4	28.8	28.1	53	56	54
14	PI086456	III	35.2	29.9	32.6	68	58	63
15	PI088306	III	39.5	40.0	39.8	77	77	77
16	PI088310	III	41.5	40.7	41.1	81	79	80
17	PI088350	III	35.1	32.7	33.9	68	63	66
18	PI088447	III	37.2	35.3	36.3	72	68	70
19	PI090566-1	III	33.3	30.2	31.8	NR[5]	NR[5]	NR[5]
20	PI091113	III	41.2	37.6	39.4	80	73	76
21	PI091142	III	42.8	41.0	41.9	83	79	81
22	PI091730-1	III	35.2	36.6	35.9	68	71	70
23	PI153309	III	35.9	37.6	36.8	70	73	71
24	PI227328	III	44.8	34.1	39.5	87	66	77
25	PI248402	IV	38.3	38.3	38.3	74	74	74
26	PI253665D	III	43.5	34.4	39.0	84	67	76
27	PI283331	III	35.4	35.4	35.4	69	68	69
28	PI398881	III	38.8	40.4	39.6	75	78	77
29	PI404161	IV	37.6	32.0	34.8	73	62	67
30	PI415074	III	40.9	37.0	39.0	80	72	76
31	PI424405B	IV	37.3	40.4	38.9	72	78	75
32	PI507295	III	45.4	38.0	41.7	88	74	81
33[6]	PI084656	III	.	34.8	.	.	67	.
34[6]	PI092718-2	III	.	32.3	.	.	62	.
35[6]	PI167240	III	.	30.9	.	.	60	.
36[6]	PI437863B	III	.	31.8	.	.	62	.
	LSMean		40.3	38.0	39.5	75	70	73

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] Maturity group assigned by USDA Soybean Germplasm Collection.
[3] Yield averaged over 1998 and 1999.
[4] Yield as Percent of Check(s) was calculated by dividing accession yield by the yield of the appropriate check (or checks averaged together).
[5] Not Rated due to early maturity- no checks to compare against.
[6] These accessions were only evaluated in 1999.

Table 38. Two-year summary (1998 and 1999) of overall agronomic performance of Asian soybean varieties in the SAGE Test 3 (primarily maturity groups III and IV). Means are presented as LSMeans from the GLM procedure of SAS [1]. Only traits that were recorded in both years are reported here.

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)
1	**9352**	51.5	27	32	1.6	14.2
2	**9421**	54.1	29	38	2.0	15.5
3	**Cisne**	52.1	30	34	2.0	19.0
4	**Iroquois**	49.5	22	35	1.7	15.0
5	**Macon**	51.0	28	33	1.8	15.4
6	**PI574477**	39.9	29	37	2.9	15.1
7	**PI592936**	36.6	18	29	1.9	17.8
8	**PI592946**	37.0	26	31	1.8	18.6
9	**PI592947**	40.9	32	33	2.4	16.0
10	**FC004007B**	32.7	19	30	2.8	12.8
11	**FC029333**	38.3	20	39	3.4	14.6
12	**PI068560**	36.7	18	35	2.8	19.4
13	**PI086114**	28.1	18	35	3.5	15.8
14	**PI086456**	32.6	18	33	2.5	19.9
15	**PI088306**	39.8	22	24	2.6	25.1
16	**PI088310**	41.1	20	25	2.6	21.7
17	**PI088350**	33.9	17	34	3.0	18.9
18	**PI088447**	36.3	23	34	3.6	18.4
19	**PI090566-1**	31.8	15	29	3.0	14.0
20	**PI091113**	39.4	19	35	3.2	15.0
21	**PI091142**	41.9	22	36	3.0	16.2
22	**PI091730-1**	35.9	23	34	3.8	16.0
23	**PI153309**	36.8	19	40	3.7	13.4
24	**PI227328**	39.5	20	33	3.0	18.4
25	**PI248402**	38.3	30	36	1.9	17.4
26	**PI253665D**	39.0	18	30	2.1	19.4
27	**PI283331**	35.4	27	39	3.3	15.2
28	**PI398881**	39.6	19	37	2.5	16.1
29	**PI404161**	34.8	28	32	3.4	16.6
30	**PI415074**	39.0	19	32	2.6	18.1
31	**PI424405B**	38.9	27	37	2.7	15.0
32	**PI507295**	41.7	21	24	2.3	13.7
33[4]	**PI084656**	.	.	.	.	.
34[4]	**PI092718-2**	.	.	.	.	.
35[4]	**PI167240**	.	.	.	.	.
36[4]	**PI437863B**	.	.	.	.	.
	LSMean	**39.6**	**22**	**33**	**2.6**	**16.8**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.
[2] Four locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.
[3] 1=best, 5=worst.
[4] These accessions were only tested in 1998.

Table 39. Two-year summary (1998 and 1999) of seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 3 (primarily maturity group III and IV). Only accessions tested in both years have values reported here.

				Fatty Acid Composition [1] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [2]
		%							
1	9352	22.3	40.6	10.0	4.1	26.7	52.8	6.4	14.2
2	9421	21.6	41.9	10.6	4.2	25.5	53.4	6.4	14.8
3	CISNE	21.1	43.9	10.3	5.2	26.4	51.4	6.8	15.5
4	IROQUOIS	21.5	41.2	11.2	4.3	24.8	53.5	6.3	15.4
5	MACON	21.7	40.7	10.8	4.3	24.7	53.3	7.1	15.1
6	PI574477	21.1	42.8	9.9	4.2	24.3	55.2	6.7	14.0
7	PI592936	20.5	43.2	11.1	4.0	31.0	47.9	6.1	15.1
8	PI592946	21.4	43.6	11.1	4.7	24.0	53.8	6.6	15.8
9	PI592947	20.2	41.4	10.7	4.8	27.3	51.5	5.9	15.5
10	FC004007B	20.1	43.3	10.2	4.2	26.5	52.0	7.2	14.4
11	FC029333	20.5	42.6	10.7	4.2	24.4	53.7	7.3	14.8
12	PI068560	22.7	41.7	10.1	4.2	29.0	50.8	6.2	14.2
13	PI086114	20.6	42.1	9.8	4.6	33.0	46.6	6.1	14.3
14	PI086456	22.3	41.8	9.8	4.2	30.2	49.9	6.0	14.0
15	PI088306	20.9	43.0	11.5	4.5	28.8	48.7	6.6	16.0
16	PI088310	21.2	42.7	11.6	4.3	26.2	51.1	6.9	15.9
17	PI088350	22.4	41.8	10.0	4.1	28.7	51.3	6.0	14.1
18	PI088447	20.2	42.0	10.7	4.2	25.0	52.6	7.7	14.9
19	PI090566-1	22.3	40.1	11.1	4.5	26.3	52.1	6.2	15.6
20	PI091113	21.4	40.1	11.0	3.9	31.6	47.6	6.0	14.9
21	PI091142	20.5	41.0	10.5	4.2	24.0	54.1	7.5	14.6
22	PI091730-1	19.3	44.3	11.1	4.1	24.6	52.7	7.7	15.2
23	PI153309	21.1	41.8	10.9	4.1	23.8	54.0	7.3	15.0
24	PI227328	19.7	43.9	11.3	3.7	26.8	51.4	7.0	14.9
25	PI248402	21.5	42.6	10.6	5.0	26.0	52.2	6.5	15.5
26	PI253665D	21.0	43.2	10.9	4.6	30.4	48.3	6.0	15.5
27	PI283331	19.6	44.1	10.5	4.2	28.5	50.4	6.5	14.7
28	PI398881	21.2	42.8	10.7	4.8	24.0	53.8	7.0	15.4
29	PI404161	19.6	41.7	10.6	4.5	30.0	48.5	6.6	15.0
30	PI415074	20.1	42.3	10.0	4.2	26.9	52.9	6.2	14.2
31	PI424405B	20.7	42.5	10.4	4.8	23.0	55.2	6.8	15.2
32	PI507295	21.8	40.9	11.6	4.4	25.6	51.6	7.0	16.0
33[3]	PI084656	.	.	.	.	.	.	.	.
34[3]	PI092718-2	.	.	.	.	.	.	.	.
35[3]	PI167240	.	.	.	.	.	.	.	.
36[3]	PI437863B	.	.	.	.	.	.	.	.
	LSMEAN	21.0	42.2	10.6	4.3	26.8	51.7	6.6	15.0

[1] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[2] Total of saturated fatty acids (16:0 + 18:0).
[3] This accession was added to the study in 1999.
[4] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 5

(Primarily maturity group IV and V)

SUMMARY ACROSS LOCATIONS IN 1999

Table 40. Morphological characteristics and origin of accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1999.

Code	PI Number	Accession Name	Origin	Flower Color[1]	Pubescence Color[2]	Stem Termin.[3]	Podwall Color[4]	Hilum Color[5]	Seed Coat Color[6]	Maturity Group[7]
6	PI423897	Tamahikari	Japan	W	G	D	Br	Y	Y	V
7	PI423912	Misuzu Daizu	Japan	W	G	D	Br	Bf	Y	V
8	PI561388	Nakasennari	Japan	P	G	D	Br	Y	Y	V
9	PI398434		Korea, South	P	G	D	Tn	Bf	Y	V
10	PI398580		Korea, South	P	G	D	Tn	Y	Y	VI
11	PI398610		Korea, South	P	G	D	Tn	Br	Y	V
12	PI398612		Korea, South	P	G	D	Tn	Br	Y	V
13	PI398833		Korea, South	P	G	D	Tn	Bf	Y	V
14	PI398976		Korea, South	P	G	D	Tn	Bf	Y	V
15	PI399044		Korea, South	W	T	D	Tn	Br	Y	V
16	PI399045		Korea, South	W	T	D	Tn	Br	Y	V
17	PI399122		Korea, South	P	T	D	Tn	Bl	Y	V
18	PI407837		Korea, South	W	G	D	Tn	Br	Y	V
19	PI407910		Korea, South	P	G	D	Tn	Br	Y	V
20	PI407911		Korea, South	P	G	D	Tn	Br	Y	V
21	PI407975B		Korea, South	W	G	D	Tn	Bf	Y	V
22	PI407993		Korea, South	P	T	D	Br	Br	Br	V
23	PI407994		Korea, South	W	G	D	Tn	Bf	Y	V
24	PI408037		Korea, South	P	G	D	Br	Bf	Gn	V
25	PI408040-2		Korea, South	W	T	D	Br	Br	Y	V
26	PI408041		Korea, South	P	G	D	Br	Bf	Gn	V
27	PI408219		Korea, South	W	G	D	Br	Br	Y	V
28	PI408250		Korea, South	P	G	D	Tn	Bf	Y	V
29	PI408337		Korea, South	W	T	D	Tn	Br	Y	V
30	PI408339		Korea, South	W	T	D	Tn	Br	Y	V
31	PI417331	Shiro Pankon	Japan	P	T	D	Br	Bf	Y	V
32	PI423759		Korea, South	P	G	D	Tn	Bf	Y	V
33	PI423773		Korea, South	W	G	N	Br	Br	Gn	V
34	PI423900	Aisa	Japan	P	G	D	Tn	Bf	Y	VI
35	PI424178B		Korea, South	P	T	D	Br	Br	Gn	V
36	PI424415		Korea, South	P	G	D	Br	Bl	Gn	V

Table 40 Continued. Morphological characteristics and origin of accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1999.

Code	PI Number	Accession Name	Origin	Flower Color[1]	Pubescence Color[2]	Stem Termin.[3]	Podwall Color[4]	Hilum Color[5]	Seed Coat Color[6]	Maturity Group[7]
37	PI458073		Korea, South	P	T	D	Br	Br	Gn	V
38	PI471931		Nepal	W	G	D	Br	Bf	Y	V
39	PI471938		Nepal	P	G	N	Tn	Y	Y	V
40	PI506651	Dai-ichi Hienuki 10-3	Japan	P	T	D	Br	Bf	Gn	V
41	PI506660	Date Ao	Japan	W	T	D	Br	Br	Gn	V
42	PI507079	Nakasennari	Japan	P	G	D	Br	Y	Y	V
43	PI507098	Nitchuu 47	Japan	P	G	D	Tn	G	Y	V
44	PI507269	Shiro Mitsu Mame	Japan	P	G	D	Br	Bf	Y	V
45	PI507369	Touhoku 53	Japan	P	G	D	Br	Y	Y	IV
46	PI508294		Korea, South	P	G	D	Tn	Br	Y	V
47	PI509098		Korea, South	P	G	D	Tn	Y	Y	V
48	PI509106		Korea, South	P	T	D	Br	Bl	Gn	V

[1] P= Purple, W= White, Dp= Dark purple.
[2] G= Gray, T= Tawny.
[3] D= Determinate, N= Indeterminate.
[4] Br= Brown, Tn= Tan, Dbr= Dark Brown.
[5] Y= Yellow, Bf= Buff, Lbf= Light buff, Ibl= Imperfect Black, Br= Brown.
[6] Y= Yellow, Lg= Light gray, Gn = Green.
[7] Maturity group assigned by USDA Soybean Germplasm Collection.

Table 41. Overall agronomic performance of Asian soybean varieties in the SAGE Test 5 (primarily maturity group V) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1].

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)	Shattering (0 to 9) [4]
1	**Manokin**	43.0	47	28	1.9	12.4	1.0
2	**9594**	53.0	58	33	2.3	13.9	0.0
3	**Graham**	45.9	50	29	1.4	13.2	1.0
4	**Hutcheson**	47.3	52	31	1.5	13.7	0.0
5	**Dillon**	48.7	61	37	1.9	14.9	0.0
6	**PI423897**	27.6	53	27	1.8	23.9	3.0
7	**PI423912**	33.0	55	25	2.1	24.7	4.0
8	**PI561388**	33.1	52	26	1.9	18.2	4.0
9	**PI398434**	29.3	59	29	4.4	7.8	4.0
10	**PI398580**	33.8	59	34	3.6	12.0	0.0
11	**PI398610**	28.4	56	30	3.1	9.9	1.0
12	**PI398612**	30.3	59	33	3.3	9.7	2.0
13	**PI398833**	32.7	48	19	2.1	11.2	5.0
14	**PI398976**	34.9	48	20	2.0	10.3	4.0
15	**PI399044**	38.0	44	29	2.3	11.6	1.0
16	**PI399045**	36.3	44	29	1.8	13.3	1.0
17	**PI399122**	32.5	58	34	3.6	10.8	1.0
18	**PI407837**	28.9	55	29	1.8	11.5	1.0
19	**PI407910**	33.2	58	34	2.6	13.5	0.0
20	**PI407911**	31.6	57	33	2.6	13.0	1.0
21	**PI407975B**	26.6	48	14	1.5	14.0	4.0
22	**PI407993**	23.8	61	25	3.8	23.3	1.0
23	**PI407994**	31.9	50	18	1.7	14.0	2.0
24	**PI408037**	32.9	56	30	2.3	14.6	1.0
25	**PI408040-2**	32.6	58	29	2.4	21.9	1.0
26	**PI408041**	29.0	56	26	2.4	14.5	0.0
27	**PI408219**	32.9	56	30	2.7	15.2	2.0
28	**PI408250**	28.4	47	21	2.5	10.2	6.0
29	**PI408337**	34.2	44	29	1.9	12.0	1.0
30	**PI408339**	34.9	44	29	2.2	11.8	0.0

Table 41 Continued. Overall agronomic performance of Asian soybean varieties in the SAGE Test 5 (primarily maturity group V) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1].

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)	Shattering (0 to 9) [4]
31	**PI417331**	31.5	51	21	1.8	21.5	2.0
32	**PI423759**	33.6	57	30	2.9	8.7	2.0
33	**PI423773**	26.8	59	50	4.3	12.1	4.0
34	**PI423900**	34.0	56	35	2.9	13.0	3.0
35	**PI424178B**	22.1	49	26	2.2	9.1	4.0
36	**PI424415**	33.6	62	28	3.4	19.0	1.0
37	**PI458073**	28.7	57	27	2.3	15.7	3.0
38	**PI471931**	40.4	47	29	2.1	12.8	0.0
39	**PI471938**	37.8	55	31	1.9	13.9	0.0
40	**PI506651**	27.1	51	23	1.7	16.6	4.0
41	**PI506660**	33.3	52	21	1.6	23.4	1.0
42	**PI507079**	37.7	53	29	2.0	18.5	4.0
43	**PI507098**	28.0	46	26	2.0	16.9	3.0
44	**PI507269**	35.7	61	34	3.4	17.2	3.0
45	**PI507369**	24.6	48	21	1.7	17.0	6.0
46	**PI508294**	32.4	49	24	2.2	8.3	6.0
47	**PI509098**	29.9	47	20	1.9	8.7	5.0
48	**PI509106**	30.7	54	25	2.1	13.6	5.0
	LSMEAN	**33.3**	**53**	**28**	**2.4**	**14.3**	**2.3**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.
[2] Three locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.
[3] 1=best, 5=worst.
[4] 0=none; 9=80-90% shattering. Shattering occurred after harvest and thus, did not affect yield results.

Table 42. Seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 5 (primarily maturity group IV and V) evaluated in 1999. Individual values are the average of 3 locations (one replication per location) and reported as LSMeans from the GLM procedure of SAS [1].

				Fatty Acid Composition [2] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [3]
		%							
1	MANOKIN	21.2	42.3	11.4	4.5	25.6	52.5	6.1	15.9
2	9594	21.0	40.9	11.2	3.7	22.4	55.7	7.2	14.9
3	GRAHAM	22.1	40.8	11.3	4.1	19.8	56.8	8.1	15.4
4	HUTCH	22.1	41.3	10.9	4.1	22.0	56.0	7.1	15.0
5	DILLON	20.9	41.8	9.9	4.0	23.3	55.7	7.1	13.8
6	PI423897	18.8	44.1	10.7	3.9	27.8	50.6	7.0	14.6
7	PI423912	18.9	44.4	10.4	3.3	28.4	50.7	7.3	13.7
8	PI561388	19.2	44.8	11.0	3.4	23.3	55.0	7.4	14.3
9	PI398434	13.6	47.5	10.2	4.2	20.4	57.5	7.9	14.4
10	PI398580	16.6	45.7	11.7	3.8	21.4	55.2	7.9	15.5
11	PI398610	13.3	49.8	11.6	3.7	20.8	54.7	9.1	15.3
12	PI398612	13.0	48.9	10.7	4.4	20.7	55.2	9.1	15.1
13	PI398833	17.8	45.8	11.5	3.6	24.3	54.1	6.6	15.1
14	PI398976	17.5	45.1	11.6	3.9	22.8	54.1	7.6	15.5
15	PI399044	20.8	42.2	11.4	3.3	24.5	53.7	7.0	14.7
16	PI399045	20.8	41.7	11.4	3.4	24.2	54.3	6.8	14.7
17	PI399122	14.7	47.9	10.5	4.2	20.8	56.5	8.2	14.6
18	PI407837	17.2	45.7	10.2	4.4	21.4	55.5	8.6	14.6
19	PI407910	18.7	44.2	10.7	4.4	21.1	55.7	8.2	15.1
20	PI407911	18.2	44.4	11.1	4.4	20.6	55.6	8.3	15.5
21	PI407975B	18.3	47.3	11.1	3.6	23.6	54.0	7.9	14.7
22	PI407993	.	.	8.7	4.4	22.0	56.6	8.5	13.1
23	PI407994	17.0	47.7	11.1	3.4	20.9	56.0	8.7	14.5
24	PI408037	18.3	45.0	10.1	3.9	22.6	55.2	8.4	13.9
25	PI408040-2	19.0	46.2	10.8	3.6	25.4	53.0	7.3	14.4
26	PI408041	18.2	44.9	10.5	3.8	21.1	55.9	8.9	14.3
27	PI408219	17.8	45.9	10.7	3.7	24.3	53.7	7.8	14.3
28	PI408250	17.8	45.7	11.5	3.7	24.0	54.2	6.6	15.2
29	PI408337	20.5	42.1	11.7	3.4	21.4	56.3	7.4	15.0
30	PI408339	20.8	41.7	12.0	3.4	22.0	55.2	7.4	15.4
31	PI417331	19.2	46.0	10.9	3.9	26.0	53.0	6.3	14.8
32	PI423759	16.0	45.6	11.0	4.3	18.2	58.0	8.7	15.2
33	PI423773	18.8	43.4	10.2	4.3	23.6	53.5	8.5	14.5
34	PI423900	16.4	46.0	10.7	3.4	22.2	54.4	9.3	14.1
35	PI424178B	18.1	44.1	10.9	4.4	25.2	52.1	7.5	15.3
36	PI424415	18.4	45.8	11.0	3.7	22.4	55.3	7.7	14.7
37	PI458073	19.6	43.3	11.0	3.6	23.6	54.5	7.4	14.6
38	PI471931	22.2	41.9	11.1	3.7	20.8	57.1	7.3	14.8
39	PI471938	21.5	41.1	10.4	4.2	22.7	55.1	7.6	14.6
40	PI506651	18.3	45.9	11.0	3.5	22.4	55.5	7.7	14.5

Table 42 Continued. Protein, oil and fatty acid analysis of exotic soybean varieties for SAGE Test 5.

				Fatty Acid Composition [2] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [3]
		%							
41	**PI506660**	19.3	44.3	11.2	3.7	23.0	54.5	7.8	14.8
42	**PI507079**	19.1	44.6	11.2	3.8	26.2	52.1	6.8	15.0
43	**PI507098**	20.2	44.4	11.3	5.1	25.7	52.0	5.9	16.4
44	**PI507269**	18.0	45.6	11.3	4.3	20.7	55.8	8.0	15.6
45	**PI507369**	19.9	43.1	11.0	4.0	24.3	53.6	7.1	15.0
46	**PI508294**	17.1	47.1	12.5	3.8	20.5	55.1	8.2	16.3
47	**PI509098**	18.2	46.3	11.2	3.8	22.8	55.4	6.8	15.0
48	**PI509106**	19.3	43.9	9.8	3.8	24.2	55.1	7.3	13.6
	LSMEAN	**18.3**	**44.4**	**10.9**	**3.9**	**22.9**	**54.7**	**7.6**	**14.8**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[3] Total of saturated fatty acids (16:0 + 18:0).

[4] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 5

(Primarily maturity group IV and V)

INDIVIDUAL LOCATIONS IN 1999

Table 43. Yield (bu/a) of soybean accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Galeena, MD	Greenville, MS	Keiser, AR	Kinston, NC	Scott, MS	LSMean
1	**Manokin**	47.0	54.6	40.6	36.3	36.6	43.0
2	**9594**	61.8	68.8	52.8	33.7	48.2	53.0
3	**Graham**	51.1	55.4	38.8	45.1	39.0	45.9
4	**Hutcheson**	48.8	62.4	45.0	40.1	40.1	47.3
5	**Dillon**	45.5	66.4	42.6	47.3	41.7	48.7
6	**PI423897**	41.1	29.6	27.7	24.8	14.7	27.6
7	**PI423912**	48.0	35.1	34.6	34.2	13.3	33.0
8	**PI561388**	44.1	35.9	31.5	37.6	16.6	33.1
9	**PI398434**	39.5	33.7	32.1	14.9	26.3	29.3
10	**PI398580**	37.7	36.0	31.8	32.0	31.4	33.8
11	**PI398610**	31.2	30.5	30.5	20.6	29.2	28.4
12	**PI398612**	24.9	34.0	36.1	25.9	30.5	30.3
13	**PI398833**	39.8	42.4	32.2	28.5	20.7	32.7
14	**PI398976**	44.6	38.4	44.4	27.1	19.8	34.9
15	**PI399044**	38.9	41.8	41.0	33.7	34.8	38.0
16	**PI399045**	38.2	44.9	40.2	30.6	27.8	36.3
17	**PI399122**	30.8	37.7	35.5	27.0	31.7	32.5
18	**PI407837**	29.6	40.3	30.6	17.9	26.3	28.9
19	**PI407910**	37.6	43.7	32.0	21.4	31.3	33.2
20	**PI407911**	38.4	40.2	32.6	20.5	26.6	31.6
21	**PI407975B**	44.0	31.0	25.0	21.3	11.8	26.6
22	**PI407993**	28.7	34.0	18.8	16.3	21.2	23.8
23	**PI407994**	43.2	40.7	33.3	23.1	19.5	31.9
24	**PI408037**	39.6	35.3	36.1	28.7	25.1	32.9
25	**PI408040-2**	35.0	40.3	37.8	26.9	23.2	32.6
26	**PI408041**	30.8	36.0	34.0	20.3	24.2	29.0
27	**PI408219**	34.9	46.5	34.2	27.9	20.9	32.9
28	**PI408250**	35.9	36.6	26.0	23.1	20.3	28.4
29	**PI408337**	39.3	44.5	27.6	30.7	28.8	34.2
30	**PI408339**	39.9	44.4	26.1	31.7	32.5	34.9
31	**PI417331**	42.9	36.3	37.1	23.4	18.1	31.5
32	**PI423759**	39.9	41.9	33.9	27.2	25.2	33.6
33	**PI423773**	34.7	33.8	26.3	18.7	20.6	26.8
34	**PI423900**	37.7	44.3	34.0	26.9	27.2	34.0
35	**PI424178B**	32.1	25.4	30.7	14.1	8.5	22.1
36	**PI424415**	38.7	40.5	26.1	39.3	23.6	33.6
37	**PI458073**	38.8	28.5	32.6	26.3	17.3	28.7
38	**PI471931**	46.1	49.2	39.4	33.1	34.5	40.4
39	**PI471938**	37.7	43.5	39.9	33.3	34.6	37.8
40	**PI506651**	33.1	32.6	33.2	23.8	13.0	27.1
41	**PI506660**	45.1	37.7	40.6	27.4	15.8	33.3
42	**PI507079**	44.3	42.6	42.5	40.4	18.6	37.7
43	**PI507098**	35.1	28.8	41.0	19.8	15.5	28.0
44	**PI507269**	37.5	43.5	32.7	37.7	27.2	35.7
45	**PI507369**	36.8	12.3	35.7	24.8	13.4	24.6
46	**PI508294**	32.5	37.4	37.8	32.9	21.8	32.4
47	**PI509098**	40.0	34.4	36.6	25.8	12.6	29.9
48	**PI509106**	37.4	33.0	30.9	33.2	18.8	30.7
	LSMean	**39.1**	**39.7**	**34.6**	**28.3**	**24.6**	**33.3**
	LSD(0.05) [2]	**6.5**	**9.4**	**8.2**	**5.4**	**5.4**	**3.1**
	CV (%)	**8**	**12**	**12**	**10**	**11**	**11**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

[2] A single LSD value is given for each location although LSMeans are presented. These LSD values closely approximate the individual pairwise LSD's obtained from the LSMean provided by SAS.

Table 44. Maturity Date (September 1 = 1) of soybean accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Galeena, MD	Greenville, MS	Keiser, AR [2]	Kinston, NC	Scott, MS [2]	LSMean
1	**Manokin**	50	52	.	32	.	47
2	**9594**	63	58	.	52	.	58
3	**Graham**	51	53	.	38	.	50
4	**Hutcheson**	55	56	.	38	.	52
5	**Dillon**	62	63	.	55	.	61
6	**PI423897**	53	58	.	42	.	53
7	**PI423912**	55	56	.	47	.	55
8	**PI561388**	54	52	.	45	.	52
9	**PI398434**	55	62	.	55	.	59
10	**PI398580**	58	59	.	54	.	59
11	**PI398610**	54	61	.	49	.	56
12	**PI398612**	56	63	.	49	.	59
13	**PI398833**	50	51	.	39	.	48
14	**PI398976**	51	47	.	38	.	48
15	**PI399044**	48	43	.	29	.	44
16	**PI399045**	48	44	.	30	.	44
17	**PI399122**	56	63	.	48	.	58
18	**PI407837**	53	61	.	42	.	55
19	**PI407910**	57	63	.	45	.	58
20	**PI407911**	54	64	.	44	.	57
21	**PI407975B**	52	53	.	37	.	48
22	**PI407993**	56	64	.	57	.	61
23	**PI407994**	54	57	.	40	.	50
24	**PI408037**	54	60	.	44	.	56
25	**PI408040-2**	53	62	.	47	.	58
26	**PI408041**	51	63	.	46	.	56
27	**PI408219**	51	63	.	47	.	56
28	**PI408250**	50	48	.	37	.	47
29	**PI408337**	49	44	.	30	.	44
30	**PI408339**	48	44	.	29	.	44
31	**PI417331**	50	57	.	37	.	51
32	**PI423759**	56	60	.	48	.	57
33	**PI423773**	56	61	.	51	.	59
34	**PI423900**	56	61	.	46	.	56
35	**PI424178B**	46	54	.	38	.	49
36	**PI424415**	53	64	.	58	.	62
37	**PI458073**	52	62	.	47	.	57
38	**PI471931**	50	48	.	35	.	47
39	**PI471938**	54	58	.	42	.	55
40	**PI506651**	48	57	.	37	.	51
41	**PI506660**	49	60	.	38	.	52
42	**PI507079**	52	55	.	45	.	53
43	**PI507098**	51	44	.	35	.	46
44	**PI507269**	58	63	.	55	.	61
45	**PI507369**	47	43	.	35	.	48
46	**PI508294**	49	52	.	36	.	49
47	**PI509098**	51	49	.	36	.	47
48	**PI509106**	53	56	.	42	.	54
	LSMean	**53**	**56**	.	**43**	.	**53**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 45. Plant Height (inches) of soybean accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Galeena, MD	Greenville, MS	Keiser, AR [2]	Kinston, NC	Scott, MS	LSMean
1	**Manokin**	31	22	.	35	24	28
2	**9594**	40	26	.	39	28	33
3	**Graham**	35	21	.	35	25	29
4	**Hutcheson**	37	24	.	36	26	31
5	**Dillon**	42	31	.	41	34	37
6	**PI423897**	36	17	.	32	22	27
7	**PI423912**	31	20	.	29	21	25
8	**PI561388**	31	20	.	33	19	26
9	**PI398434**	34	21	.	35	26	29
10	**PI398580**	45	25	.	41	26	34
11	**PI398610**	35	25	.	35	25	30
12	**PI398612**	40	26	.	42	25	33
13	**PI398833**	28	14	.	20	13	19
14	**PI398976**	31	15	.	23	13	20
15	**PI399044**	36	22	.	32	28	29
16	**PI399045**	35	21	.	34	27	29
17	**PI399122**	42	30	.	36	28	34
18	**PI407837**	35	20	.	37	26	29
19	**PI407910**	43	26	.	38	28	34
20	**PI407911**	42	29	.	39	23	33
21	**PI407975B**	19	12	.	16	11	14
22	**PI407993**	28	18	.	31	23	25
23	**PI407994**	25	16	.	19	14	18
24	**PI408037**	39	24	.	39	20	30
25	**PI408040-2**	35	20	.	36	26	29
26	**PI408041**	35	25	.	33	11	26
27	**PI408219**	39	22	.	37	22	30
28	**PI408250**	33	16	.	21	16	21
29	**PI408337**	37	24	.	30	24	29
30	**PI408339**	34	26	.	31	27	29
31	**PI417331**	30	16	.	23	15	21
32	**PI423759**	37	20	.	38	25	30
33	**PI423773**	55	44	.	55	48	50
34	**PI423900**	45	26	.	38	32	35
35	**PI424178B**	33	26	.	23	20	26
36	**PI424415**	35	18	.	36	25	28
37	**PI458073**	34	18	.	34	23	27
38	**PI471931**	36	23	.	34	24	29
39	**PI471938**	36	24	.	36	28	31
40	**PI506651**	31	18	.	27	17	23
41	**PI506660**	30	16	.	27	13	21
42	**PI507079**	33	24	.	35	23	29
43	**PI507098**	31	20	.	32	21	26
44	**PI507269**	42	23	.	43	29	34
45	**PI507369**	24	14	.	20	24	21
46	**PI508294**	34	18	.	27	18	24
47	**PI509098**	30	14	.	22	12	20
48	**PI509106**	31	16	.	32	21	25
	LSMean	**35**	**22**	.	**33**	**23**	**28**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 46. Plant Lodging score (1=erect, 5=prostrate) of soybean accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Galeena, MD	Greenville, MS	Keiser, AR [2]	Kinston, NC	Scott, MS	LSMean
1	**Manokin**	3.0	1.5	.	1.5	1.8	1.9
2	**9594**	2.8	1.5	.	3.0	1.8	2.3
3	**Graham**	2.0	1.5	.	1.3	1.0	1.4
4	**Hutcheson**	2.0	1.5	.	1.5	1.0	1.5
5	**Dillon**	2.3	1.5	.	2.0	1.8	1.9
6	**PI423897**	3.0	1.5	.	1.8	1.0	1.8
7	**PI423912**	2.5	1.5	.	2.5	1.8	2.1
8	**PI561388**	2.5	1.5	.	2.8	1.0	1.9
9	**PI398434**	4.5	4.5	.	3.8	4.8	4.4
10	**PI398580**	3.8	3.5	.	3.5	3.8	3.6
11	**PI398610**	3.5	3.5	.	3.3	2.3	3.1
12	**PI398612**	4.3	3.5	.	3.0	2.3	3.3
13	**PI398833**	3.8	1.5	.	2.3	1.0	2.1
14	**PI398976**	3.3	2.0	.	1.8	1.0	2.0
15	**PI399044**	3.8	1.5	.	2.0	1.8	2.3
16	**PI399045**	3.0	1.5	.	1.8	1.0	1.8
17	**PI399122**	4.3	3.0	.	3.3	3.8	3.6
18	**PI407837**	2.3	1.5	.	2.5	1.0	1.8
19	**PI407910**	3.5	2.0	.	3.0	1.8	2.6
20	**PI407911**	3.8	1.5	.	3.0	2.3	2.6
21	**PI407975B**	2.5	1.5	.	1.0	1.0	1.5
22	**PI407993**	4.8	3.0	.	4.3	3.3	3.8
23	**PI407994**	3.3	1.5	.	1.0	1.0	1.7
24	**PI408037**	2.5	1.5	.	2.8	2.3	2.3
25	**PI408040-2**	3.3	1.5	.	2.8	2.3	2.4
26	**PI408041**	3.0	1.5	.	2.8	2.3	2.4
27	**PI408219**	3.0	3.0	.	3.0	1.8	2.7
28	**PI408250**	4.3	1.5	.	2.0	2.3	2.5
29	**PI408337**	2.8	1.5	.	1.8	1.8	1.9
30	**PI408339**	3.3	1.5	.	1.8	2.3	2.2
31	**PI417331**	2.5	2.0	.	1.0	1.8	1.8
32	**PI423759**	3.8	2.0	.	3.3	2.8	2.9
33	**PI423773**	4.0	4.5	.	4.0	4.8	4.3
34	**PI423900**	4.0	2.0	.	3.0	2.8	2.9
35	**PI424178B**	3.8	2.0	.	1.3	1.8	2.2
36	**PI424415**	4.3	3.0	.	3.8	2.8	3.4
37	**PI458073**	2.8	1.5	.	3.3	1.8	2.3
38	**PI471931**	3.0	1.5	.	2.0	1.8	2.1
39	**PI471938**	3.0	1.5	.	2.0	1.0	1.9
40	**PI506651**	2.8	2.0	.	1.0	1.0	1.7
41	**PI506660**	2.8	1.5	.	1.0	1.0	1.6
42	**PI507079**	3.0	1.5	.	2.5	1.0	2.0
43	**PI507098**	3.0	1.5	.	1.8	1.8	2.0
44	**PI507269**	4.0	3.0	.	3.3	3.3	3.4
45	**PI507369**	3.3	1.5	.	1.0	1.0	1.7
46	**PI508294**	4.0	2.0	.	1.8	1.0	2.2
47	**PI509098**	3.5	1.5	.	1.8	1.0	1.9
48	**PI509106**	3.3	1.5	.	2.8	1.0	2.1
	LSMean	**3.3**	**2.0**	.	**2.4**	**1.9**	**2.4**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 47. Seed Weight (g/100 seed) of soybean accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

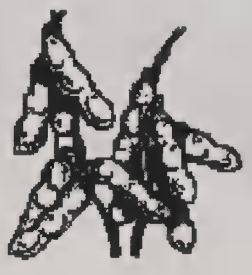
Code	Name	Galeena, MD [2]	Greenville, MS [2]	Keiser, AR	Kinston, NC	Scott, MS [2]	LSMean
1	**Manokin**	.	.	13.4	11.4	.	12.4
2	**9594**	.	.		13.9	.	13.9
3	**Graham**	.	.	14.1	12.3	.	13.2
4	**Hutcheson**	.	.	14.9	12.5	.	13.7
5	**Dillon**	.	.	15.9	13.9	.	14.9
6	**PI423897**	.	.	26.9	21.0	.	23.9
7	**PI423912**	.	.	27.6	21.9	.	24.7
8	**PI561388**	.	.	19.6	16.8	.	18.2
9	**PI398434**	.	.	8.0	7.7	.	7.8
10	**PI398580**	.	.	13.4	10.5	.	12.0
11	**PI398610**	.	.	10.3	9.4	.	9.9
12	**PI398612**	.	.	10.2	9.3	.	9.7
13	**PI398833**	.	.	14.8	7.6	.	11.2
14	**PI398976**	.	.	12.4	8.2	.	10.3
15	**PI399044**	.	.	12.7	10.6	.	11.6
16	**PI399045**	.	.	16.0	10.6	.	13.3
17	**PI399122**	.	.	12.4	9.3	.	10.8
18	**PI407837**	.	.	12.5	10.5	.	11.5
19	**PI407910**	.	.	15.7	11.4	.	13.5
20	**PI407911**	.	.	15.2	10.7	.	13.0
21	**PI407975B**	.	.	15.2	12.8	.	14.0
22	**PI407993**	.	.	24.3	22.3	.	23.3
23	**PI407994**	.	.	15.7	12.3	.	14.0
24	**PI408037**	.	.	17.1	12.2	.	14.6
25	**PI408040-2**	.	.	24.3	19.5	.	21.9
26	**PI408041**	.	.	16.1	12.9	.	14.5
27	**PI408219**	.	.	16.7	13.7	.	15.2
28	**PI408250**	.	.	8.3	12.0	.	10.2
29	**PI408337**	.	.	12.6	11.4	.	12.0
30	**PI408339**	.	.	13.2	10.4	.	11.8
31	**PI417331**	.	.	26.1	17.0	.	21.5
32	**PI423759**	.	.	9.5	7.9	.	8.7
33	**PI423773**	.	.	13.2	11.1	.	12.1
34	**PI423900**	.	.	14.6	11.4	.	13.0
35	**PI424178B**	.	.	10.3	8.0	.	9.1
36	**PI424415**	.	.	20.2	17.8	.	19.0
37	**PI458073**	.	.	16.5	14.9	.	15.7
38	**PI471931**	.	.	13.8	11.8	.	12.8
39	**PI471938**	.	.	15.7	12.2	.	13.9
40	**PI506651**	.	.	18.3	14.9	.	16.6
41	**PI506660**	.	.	25.9	20.9	.	23.4
42	**PI507079**	.	.	19.1	17.9	.	18.5
43	**PI507098**	.	.	19.2	14.7	.	16.9
44	**PI507269**	.	.	18.0	16.4	.	17.2
45	**PI507369**	.	.	18.4	15.5	.	17.0
46	**PI508294**	.	.	8.9	7.8	.	8.3
47	**PI509098**	.	.	9.3	8.0	.	8.7
48	**PI509106**	.	.	13.6	13.7	.	13.6
	LSMean	.	.	**15.7**	**12.9**	.	**14.3**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 48. Shattering score (0= none, 9=81-90% of pods shattered) of soybean accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1]. Shattering occurred after harvest and did not affect yield.

Code	Name	Galeena, MD [2]	Greenville, MS	Keiser, AR [2]	Kinston, NC [2]	Scott, MS [2]	LSMean
1	Manokin	.	1.0	.	.	.	1.0
2	9594	.	0.0	.	.	.	0.0
3	Graham	.	1.0	.	.	.	1.0
4	Hutcheson	.	0.0	.	.	.	0.0
5	Dillon	.	0.0	.	.	.	0.0
6	PI423897	.	3.0	.	.	.	3.0
7	PI423912	.	4.0	.	.	.	4.0
8	PI561388	.	4.0	.	.	.	4.0
9	PI398434	.	4.0	.	.	.	4.0
10	PI398580	.	0.0	.	.	.	0.0
11	PI398610	.	1.0	.	.	.	1.0
12	PI398612	.	2.0	.	.	.	2.0
13	PI398833	.	5.0	.	.	.	5.0
14	PI398976	.	4.0	.	.	.	4.0
15	PI399044	.	1.0	.	.	.	1.0
16	PI399045	.	1.0	.	.	.	1.0
17	PI399122	.	1.0	.	.	.	1.0
18	PI407837	.	1.0	.	.	.	1.0
19	PI407910	.	0.0	.	.	.	0.0
20	PI407911	.	1.0	.	.	.	1.0
21	PI407975B	.	4.0	.	.	.	4.0
22	PI407993	.	1.0	.	.	.	1.0
23	PI407994	.	2.0	.	.	.	2.0
24	PI408037	.	1.0	.	.	.	1.0
25	PI408040-2	.	1.0	.	.	.	1.0
26	PI408041	.	0.0	.	.	.	0.0
27	PI408219	.	2.0	.	.	.	2.0
28	PI408250	.	6.0	.	.	.	6.0
29	PI408337	.	1.0	.	.	.	1.0
30	PI408339	.	0.0	.	.	.	0.0
31	PI417331	.	2.0	.	.	.	2.0
32	PI423759	.	2.0	.	.	.	2.0
33	PI423773	.	4.0	.	.	.	4.0
34	PI423900	.	3.0	.	.	.	3.0
35	PI424178B	.	4.0	.	.	.	4.0
36	PI424415	.	1.0	.	.	.	1.0
37	PI458073	.	3.0	.	.	.	3.0
38	PI471931	.	0.0	.	.	.	0.0
39	PI471938	.	0.0	.	.	.	0.0
40	PI506651	.	4.0	.	.	.	4.0
41	PI506660	.	1.0	.	.	.	1.0
42	PI507079	.	4.0	.	.	.	4.0
43	PI507098	.	3.0	.	.	.	3.0
44	PI507269	.	3.0	.	.	.	3.0
45	PI507369	.	6.0	.	.	.	6.0
46	PI508294	.	6.0	.	.	.	6.0
47	PI509098	.	5.0	.	.	.	5.0
48	PI509106	.	5.0	.	.	.	5.0
	LSMean		2.3				2.3

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.



TEST 5

COMBINED RESULTS FOR 1998 AND 1999

Table 49. Two-year summary for yield of soybean accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1998 and 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	MG [2]	Yield (bu/ac)			Yield as Percent of Appropriate Maturity Check(s) [4]		
			1998	1999	'98/'99 [3]	1998	1999	'98/'99 [3]
1	Manokin	IV	44.1	43.0	43.6			
2	9594	V	52.5	53.0	52.8		%	
3	Graham	V	48.8	45.9	47.4			
4	Hutcheson	V	48.7	47.3	48.0			
5	Dillon	VI	47.1	48.7	47.9			
6	PI423897	V	29.9	27.6	28.8	61	57	59
7	PI423912	V	37.6	33.0	35.3	76	68	72
8	PI561388	V	34.0	33.1	33.6	69	60	68
9	PI398434	V	34.0	29.3	31.7	69	60	65
10	PI398580	VI	33.9	33.8	33.9	69	69	69
11	PI398610	V	32.5	28.4	30.5	66	58	62
12	PI398612	V	32.5	30.3	31.4	66	62	64
13	PI398833	V	40.8	32.7	36.8	93	76	84
14	PI398976	V	38.7	34.9	36.8	88	81	85
15	PI399044	V	38.6	38.0	38.3	88	88	88
16	PI399045	V	34.2	36.3	35.3	78	84	81
17	PI399122	V	30.7	32.5	31.6	62	67	64
18	PI407837	V	29.8	28.9	29.4	60	59	60
19	PI407910	V	34.2	33.2	33.7	69	68	69
20	PI407911	V	32.5	31.6	32.1	66	65	65
21	PI407975B	V	36.0	26.6	31.3	82	62	72
22	PI407993	V	27.9	23.8	25.9	57	49	53
23	PI407994	V	33.7	31.9	32.8	68	65	67
24	PI408037	V	28.8	32.9	30.9	58	68	63
25	PI408040-2	V	37.5	32.6	35.1	76	67	72
26	PI408041	V	34.2	29.0	31.6	69	60	64
27	PI408219	V	34.1	32.9	33.5	69	68	68
28	PI408250	V	38.8	28.4	33.6	88	66	77
29	PI408337	V	37.6	34.2	35.9	85	80	82
30	PI408339	V	36.7	34.9	35.8	83	81	82
31	PI417331	V	35.0	31.5	33.3	71	65	68
32	PI423759	V	35.4	33.6	34.5	72	69	70
33	PI423773	V	28.6	26.8	27.7	58	55	57
34	PI423900	VI	35.8	34.0	34.9	73	70	71
35	PI424178B	V	25.9	22.1	24.0	53	45	49

Table 49 Continued. Two-year summary for yield of soybean accessions in SAGE Test 5 (primarily maturity groups IV and V) evaluated in 1998 and 1999.

Code	PI Number	MG [2]	Yield (bu/ac)			Yield as Percent of Appropriate Maturity Check(s) [4]		
			1998	1999	'98/'99 [3]	1998	1999	'98/'99 [3]
36	**PI424415**	V	29.4	33.6	31.5	60	69	64
37	**PI458073**	V	27.7	28.7	28.2	56	59	58
38	**PI471931**	V	41.9	40.4	41.2	95	94	94
39	**PI471938**	V	37.4	37.8	37.6	76	78	77
40	**PI506651**	V	27.5	27.1	27.3	56	56	56
41	**PI506660**	V	35.5	33.3	34.4	72	68	70
42	**PI507079**	V	32.6	37.7	35.2	66	77	72
43	**PI507098**	V	32.3	28.0	30.2	73	65	69
44	**PI507269**	V	30.7	35.7	33.2	62	73	68
45	**PI507369**	IV	25.7	24.6	25.2	58	57	58
46	**PI508294**	V	37.2	32.4	34.8	84	75	80
47	**PI509098**	V	39.9	29.9	34.9	90	69	80
48	**PI509106**	V	34.1	30.7	32.4	69	63	66
	LSMean		**35.3**	**33.3**	**34.3**	**71**	**67**	**69**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] Maturity group assigned by USDA Soybean Germplasm Collection.
[3] Yield averaged over 1998 and 1999.
[4] Yield as Percent of Check(s) was calculated by dividing accession yield by the yield of the appropriate check (or checks averaged together).

Table 50. Two-year summary (1998 and 1999) of overall agronomic performance of Asian soybean varieties in the SAGE Test 5 (primarily maturity groups IV and V). Means are presented as LSMeans from the GLM procedure of SAS [1]. Only traits that were recorded in both years are reported here.

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	Shattering (0 to 9) [4]	100-Seed Weight (g)
1	**Manokin**	43.6	39	27	2.0	1.0	13.0
2	**9594**	52.8	48	31	2.2	0.8	16.2
3	**Graham**	47.4	43	28	1.7	1.3	15.1
4	**Hutcheson**	48.0	44	29	1.7	0.7	15.0
5	**Dillon**	47.9	52	34	2.2	0.8	15.7
6	**PI423897**	28.8	44	26	2.1	3.2	22.0
7	**PI423912**	35.3	46	23	1.9	3.3	27.0
8	**PI561388**	33.6	42	26	1.8	3.2	18.1
9	**PI398434**	31.7	48	27	3.7	2.5	8.3
10	**PI398580**	33.9	47	33	3.3	0.5	12.3
11	**PI398610**	30.5	46	27	2.7	1.5	10.7
12	**PI398612**	31.4	47	31	2.9	1.6	10.5
13	**PI398833**	36.8	39	20	2.7	3.4	11.3
14	**PI398976**	36.8	40	21	2.3	2.8	9.1
15	**PI399044**	38.3	35	28	2.6	1.2	12.6
16	**PI399045**	35.3	35	28	1.9	1.0	13.2
17	**PI399122**	31.6	48	32	3.1	1.3	10.2
18	**PI407837**	29.4	46	27	2.0	1.4	11.7
19	**PI407910**	33.7	48	30	2.4	0.8	13.3
20	**PI407911**	32.1	47	30	2.6	1.3	13.3
21	**PI407975B**	31.3	40	15	1.8	2.9	14.1
22	**PI407993**	25.9	50	25	3.3	1.0	25.4
23	**PI407994**	32.8	41	19	2.1	1.8	13.9
24	**PI408037**	30.9	47	29	2.2	1.3	15.1
25	**PI408040-2**	35.1	46	29	2.7	1.5	23.3
26	**PI408041**	31.6	47	27	2.3	0.8	15.3
27	**PI408219**	33.5	46	29	2.5	2.0	15.9
28	**PI408250**	33.6	38	22	2.7	3.8	8.9
29	**PI408337**	35.9	35	28	2.0	1.2	12.6
30	**PI408339**	35.8	34	28	2.2	0.5	12.3
31	**PI417331**	33.3	42	23	2.1	1.9	21.9
32	**PI423759**	34.5	48	28	2.9	1.8	9.2
33	**PI423773**	27.7	47	44	3.7	2.8	12.3
34	**PI423900**	34.9	46	34	2.8	2.0	13.8
35	**PI424178B**	24.0	41	25	2.3	2.9	9.4

Table 50 Continued. Two-year summary (1998 and 1999) of overall agronomic performance of Asian soybean varieties in the SAGE Test 5 (primarily maturity groups IV and V). Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	Shattering (0 to 9) [4]	100-Seed Weight (g)
36	**PI424415**	31.5	51	27	3.1	1.4	21.1
37	**PI458073**	28.2	47	28	2.2	2.7	16.1
38	**PI471931**	41.2	40	28	2.3	0.7	14.4
39	**PI471938**	37.6	47	29	2.0	0.5	11.9
40	**PI506651**	27.3	41	25	2.2	4.0	16.6
41	**PI506660**	34.4	43	21	1.8	1.7	22.4
42	**PI507079**	35.2	42	26	2.0	3.0	18.3
43	**PI507098**	30.2	37	27	2.4	2.4	16.3
44	**PI507269**	33.2	50	32	3.2	2.8	18.0
45	**PI507369**	25.2	39	21	2.0	4.3	17.0
46	**PI508294**	34.8	38	26	2.8	3.8	12.2
47	**PI509098**	34.9	39	21	2.1	3.4	8.9
48	**PI509106**	32.4	44	25	2.3	3.5	15.3
	LSMean	**34.3**	**43**	**27**	**2.4**	**2.0**	**14.8**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.
[2] Three locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.
[3] 1=best, 5=worst.
[4] 0=none; 9=80-90% shattering. Shattering occurred after harvest and thus, did not affect yield results.

Table 51. Two-year summary (1998 and 1999) of seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 5 (primarily maturity group IV and V).

				Fatty Acid Composition [1] [3]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [2]
		%							
1	MANOKIN	21.8	41.8	11.5	4.6	25.7	52.5	5.9	16.1
2	9594	21.2	41.4	11.4	3.5	22.9	55.7	6.6	14.9
3	GRAHAM	22.4	41.0	11.2	4.1	21.1	56.5	7.4	15.3
4	HUTCH	22.1	41.5	10.9	4.1	22.5	55.8	6.8	15.0
5	DILLON	21.1	42.2	10.0	3.7	24.6	55.3	6.5	13.6
6	PI423897	19.2	43.9	10.8	3.7	27.0	52.0	6.6	14.4
7	PI423912	19.3	44.1	10.6	3.3	28.7	50.6	6.9	13.9
8	PI561388	19.8	43.4	11.2	3.4	24.1	54.8	6.7	14.5
9	PI398434	14.0	46.3	10.6	4.1	21.1	57.2	7.1	14.8
10	PI398580	17.2	45.7	12.0	3.7	22.7	54.5	7.2	15.7
11	PI398610	13.3	49.7	11.9	3.7	21.4	54.4	8.6	15.6
12	PI398612	13.0	48.6	11.0	4.2	21.1	55.3	8.6	15.1
13	PI398833	18.1	45.3	11.6	3.7	24.6	54.3	6.1	15.2
14	PI398976	18.2	44.2	11.7	3.9	23.0	54.6	7.0	15.5
15	PI399044	21.3	42.0	11.4	3.4	25.5	53.3	6.4	14.8
16	PI399045	21.2	41.8	11.5	3.6	25.1	53.6	6.4	15.0
17	PI399122	14.0	48.2	10.9	4.2	21.9	55.4	7.9	15.0
18	PI407837	17.7	44.8	10.5	4.3	22.5	55.1	7.8	14.8
19	PI407910	19.4	43.2	10.9	4.3	22.2	55.5	7.2	15.1
20	PI407911	19.0	43.7	11.2	4.4	22.3	55.1	7.1	15.5
21	PI407975B	18.3	46.3	11.1	3.6	22.9	55.0	7.6	14.8
22	PI407993	.	.	9.0	4.1	22.0	57.3	7.8	13.1
23	PI407994	17.8	46.2	11.5	3.5	21.8	55.6	7.8	15.0
24	PI408037	19.8	43.6	10.2	3.8	23.2	55.8	7.3	13.9
25	PI408040-2	19.5	46.2	11.0	3.6	24.7	54.1	6.8	14.5
26	PI408041	19.6	44.0	10.5	3.7	21.5	56.4	8.1	14.2
27	PI408219	18.7	45.2	11.0	3.7	24.9	53.4	7.1	14.6
28	PI408250	17.9	45.1	11.6	3.7	24.3	54.3	6.2	15.3
29	PI408337	21.4	41.7	11.6	3.4	23.6	54.9	6.7	14.9
30	PI408339	21.4	41.5	11.8	3.5	24.0	54.2	6.7	15.2
31	PI417331	20.2	45.3	11.2	3.9	25.2	54.0	5.9	15.0
32	PI423759	16.8	44.7	11.2	4.2	19.1	58.0	7.8	15.3
33	PI423773	19.6	42.9	10.4	4.2	27.4	51.0	7.1	14.6
34	PI423900	16.4	45.8	10.9	3.4	23.4	54.2	8.3	14.2
35	PI424178B	19.2	42.8	11.1	4.2	25.1	52.9	6.9	15.3
36	PI424415	19.7	45.4	11.2	3.6	22.8	55.3	7.3	14.7
37	PI458073	20.4	42.7	11.1	3.6	24.7	54.0	6.8	14.7
38	PI471931	23.2	41.2	11.1	3.6	21.8	56.8	6.7	14.7
39	PI471938	22.1	41.2	10.6	4.3	23.2	55.3	6.8	14.9
40	PI506651	19.0	45.2	11.1	3.5	22.7	55.9	7.0	14.6

Table 51 Continued. Two-year Summary of protein, oil and fatty acid analysis of exotic soybean varieties for SAGE Test 5.

				Fatty Acid Composition [1] [3]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [2]
		%							
41	**PI506660**	19.9	43.5	11.3	3.6	22.7	55.3	7.3	14.8
42	**PI507079**	19.8	43.4	11.5	3.7	24.7	53.5	6.7	15.2
43	**PI507098**	20.7	44.3	11.5	4.9	27.5	50.8	5.5	16.4
44	**PI507269**	18.5	45.7	11.5	4.2	22.4	54.7	7.4	15.6
45	**PI507369**	20.2	42.6	11.2	3.9	24.6	53.6	6.8	15.0
46	**PI508294**	17.5	46.0	12.5	3.8	21.4	54.8	7.6	16.3
47	**PI509098**	18.4	45.6	11.3	3.8	23.6	55.2	6.3	15.1
48	**PI509106**	20.4	42.2	9.9	3.7	23.7	56.0	7.0	13.6
	LSMEAN	**19.1**	**44.1**	**11.1**	**3.8**	**23.5**	**54.6**	**7.0**	**14.9**

[1] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[2] Total of saturated fatty acids (16:0 + 18:0).
[3] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 6

(Primarily maturity group V and Later)

SUMMARY ACROSS LOCATIONS IN 1999

Table 52. Morphological characteristics and origin of accessions in SAGE Test 6 (primarily maturity group V and later) evaluated in 1999.

Code	PI Number	Accession Name	Origin	Flower Color[1]	Pubescence Color[2]	Stem Termin.[3]	Podwall Color[4]	Hilum Color[5]	Seed Coat Color[6]	Maturity Group[7]
5	PI506514	Akishirome	Japan	P	G	D	Br	Y	Y	VI
6	PI594172B	Gogaku	Japan	P	G	D	Br	Ib	Y	VII
7	FC031933		Unknown	W	T	D	Tn	Br	Y	VI
8	FC032175		Unknown	W	G	D	Tn	Bl	Y	VI
9	PI157440	Kin-du	Korea, South	W	G	D	Br	Bf	Y	V
10	PI198078	Punjab-1	India	P	T	D	Tn	Br	Y	VII
11	PI221717		South Africa	W	G	D	Br	Bf	Y	VI
12	PI408104		Korea, South	P	G	D	Br	Br	Gn	V
13	PI417263	Sakyuu Ki Mame	Japan	W	T	D	Br	Br	Y	V
14	PI423928	Uda Daizu	Japan	P	G	D	Br	Bf	Y	V
15	PI424390		Korea, South	P	T	D	Tn	Bl	Y	V
16	PI437726	Ti-jue-baj	China	W	G	D	Tn	Lbf	Y	VI
17	PI494851		Zambia	W	G	D	Tn	Lbf	Y	VI
18	PI507256	Shiro Chonkon	Japan	P	G	D	Tn	Bf	Y	V
19	PI507403	Tousan 65	Japan	P	G	D	Tn	Y	Y	V

[1] P= Purple, W= White, Dp= Dark purple.
[2] G= Gray, T= Tawny.
[3] D= Determinate, N= Indeterminate.
[4] Br= Brown, Tn= Tan, Dbr= Dark Brown.
[5] Y= Yellow, Bf= Buff, Lbf= Light buff, Ibl= Imperfect Black, Br= Brown.
[6] Y= Yellow, Lg= Light gray, Gn= Green.
[7] Maturity group assigned by USDA Soybean Germplasm Collection.

Table 53. Overall agronomic performance of Asian soybean varieties in the SAGE Test 6 (primarily maturity groups V and later) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)	Seed Quality (1 to 5) [3]	Shattering (0 to 9) [4]	Mottling (1 to 5) [3]
1	**Graham**	35.0	34	27	1.6	13.2	2.3	1.0	.
2	**Boggs**	41.3	48	33	1.8	13.8	2.0	1.0	.
3	**Dillon**	40.2	45	35	1.8	15.8	2.0	1.0	.
4	**Haskell**	32.3	57	36	2.2	16.4	1.8	1.0	.
5	**PI506514**	19.7	47	23	1.9	20.0	2.8	2.5	.
6	**PI594172B**	20.0	59	34	2.4	19.1	2.0	1.0	.
7	**FC031933**	26.5	49	35	2.5	13.5	2.3	1.0	.
8	**FC032175**	28.7	49	35	1.9	12.9	2.0	1.0	.
9	**PI157440**	26.5	41	32	2.0	14.0	3.0	1.0	.
10	**PI198078**	21.1	56	34	2.7	15.2	2.0	1.0	.
11	**PI221717**	30.4	53	40	2.7	14.8	2.4	1.0	.
12	**PI408104**	22.1	45	30	1.5	15.4	2.5	1.0	.
13	**PI417263**	18.6	38	24	2.0	14.6	3.0	3.5	.
14	**PI423928**	25.4	45	28	2.4	20.7	3.3	1.8	.
15	**PI424390**	22.9	42	29	2.6	7.8	2.0	2.0	.
16	**PI437726**	30.5	45	41	2.4	13.8	2.3	1.0	.
17	**PI494851**	31.5	48	40	2.0	14.8	2.3	1.0	.
18	**PI507256**	9.9	40	22	2.0	20.2	3.3	5.5	.
19	**PI507403**	16.9	41	26	1.9	19.1	3.3	3.0	.
	LSMEAN	**26.3**	**46**	**32**	**2.1**	**15.5**	**2.5**	**1.6**	.

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.
[2] Four locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.
[3] 1=best, 5=worst.
[4] 0=none; 9=80-90% shattering. Shattering occurred after harvest and thus, did not affect yield results.

Table 54. Seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 6 (primarily maturity group VI and later) evaluated in 1999. Individual values are the average of 3 locations (one replication per location) and reported as LSMeans from the GLM procedure of SAS [1].

				Fatty Acid Composition [2] [4]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [3]
		%							
1	GRAHAM	21.8	42.7	10.7	4.6	22.8	55.1	6.9	15.3
2	BOGGS	21.2	43.5	10.7	3.8	25.0	54.3	6.2	14.5
3	DILLON	21.1	42.5	9.7	4.3	25.0	54.2	6.9	14.0
4	HASKELL	20.4	42.4	10.7	4.3	22.5	55.4	7.1	15.0
5	PI506514	19.4	44.4	9.8	3.9	23.0	56.2	7.2	13.6
6	PI594172B	19.5	44.4	9.9	3.6	24.5	55.4	6.7	13.5
7	FC031933	18.3	46.4	10.9	5.4	25.5	51.4	7.0	16.2
8	FC032175	19.5	45.6	10.6	5.5	22.0	54.9	7.2	16.1
9	PI157440	20.4	42.9	10.8	4.1	24.3	53.9	7.0	14.9
10	PI198078	17.7	45.2	9.2	4.2	28.5	51.4	6.7	13.4
11	PI221717	20.3	42.9	9.8	3.3	24.3	55.9	6.8	13.1
12	PI408104	19.0	44.5	10.7	4.2	24.9	53.1	7.3	14.8
13	PI417263	20.4	43.9	11.1	4.1	22.8	55.3	6.9	15.1
14	PI423928	19.5	43.7	10.2	4.5	26.6	50.9	7.9	14.6
15	PI424390	15.8	47.9	11.1	4.6	22.1	54.7	7.6	15.7
16	PI437726	20.8	43.0	10.6	4.9	27.3	52.0	5.3	15.5
17	PI494851	20.9	42.6	10.6	4.4	25.0	54.5	5.7	15.0
18	PI507256	19.3	45.0	12.0	4.8	26.6	50.5	6.0	16.8
19	PI507403	18.5	46.0	11.0	4.4	21.7	55.4	7.7	15.4
	LSMEAN	19.6	44.2	10.5	4.3	24.4	53.9	6.8	14.8

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[3] Total of saturated fatty acids (16:0 + 18:0).
[4] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

TEST 6

(Primarily maturity group V and Later)

INDIVIDUAL LOCATIONS IN 1999

Table 55. Yield (bu/a) of soybean accessions in SAGE Test 6 (primarily maturity group V and later) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1].

Code	Name	Greenville, MS	Kinston, NC	Scott, MS	Athens, GA	Rohwer, AR	LSMean
1	**Graham**	60.0	30.5	31.4	17.5	35.5	35.0
2	**Boggs**	57.4	35.5	35.0	38.2	40.6	41.3
3	**Dillon**	58.8	34.8	42.2	26.0	39.4	40.2
4	**Haskell**	49.3	21.0	40.7	32.8	17.5	32.3
5	**PI506514**	23.1	20.8	11.0	21.9	21.6	19.7
6	**PI594172B**	25.6	16.8	21.1	25.0	11.7	20.0
7	**FC031933**	40.4	22.7	30.6	19.4	19.6	26.5
8	**FC032175**	42.7	26.2	35.4	21.6	17.6	28.7
9	**PI157440**	37.5	21.7	25.3	23.0	24.9	26.5
10	**PI198078**	32.3	5.6	27.9	23.3	16.6	21.1
11	**PI221717**	45.6	33.7	35.8	22.9	14.2	30.4
12	**PI408104**	27.1	23.7	16.5	17.5	25.9	22.1
13	**PI417263**	24.8	16.0	16.4	17.3	18.8	18.6
14	**PI423928**	25.5	31.8	17.1	20.8	31.6	25.4
15	**PI424390**	27.1	23.9	20.9	16.8	25.7	22.9
16	**PI437726**	49.4	22.3	39.4	21.8	19.5	30.5
17	**PI494851**	49.4	25.3	36.6	28.4	18.0	31.5
18	**PI507256**	10.6	6.1	5.1	10.1	17.8	9.9
19	**PI507403**	19.8	17.8	10.3	16.7	19.6	16.9
	LSMean	**37.2**	**22.9**	**26.2**	**22.1**	**22.9**	**26.3**
	LSD(0.05) [2]	**6.5**	**8.2**	**4.3**	**7.3**	**8.7**	**3.0**
	CV (%)	**8**	**17**	**8**	**16**	**17**	**13**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

[2] A single LSD value is given for each location although LSMeans are presented. These LSD values closely approximate the individual pairwise LSD's obtained from the LSMean provided by SAS.

Table 56. Maturity Date (September 1 = 1) of soybean accessions in SAGE Test 6 (primarily maturity group V and later) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1].

Code	Name	Greenville, MS	Kinston, NC	Scott, MS	Athens, GA	Rohwer, AR	LSMean
1	**Graham**	26	37	27	32	47	34
2	**Boggs**	38	58	39	48	59	48
3	**Dillon**	31	56	34	49	56	45
4	**Haskell**	47	64	49	61	65	57
5	**PI506514**	32	56	42	47	59	47
6	**PI594172B**	46	68	51	63	68	59
7	**FC031933**	37	59	37	55	59	49
8	**FC032175**	40	55	45	49	59	49
9	**PI157440**	30	42	35	41	57	41
10	**PI198078**	45	63	49	55	70	56
11	**PI221717**	43	60	47	51	64	53
12	**PI408104**	32	53	39	47	56	45
13	**PI417263**	33	38	41	34	46	38
14	**PI423928**	31	56	38	46	56	45
15	**PI424390**	31	54	35	38	55	42
16	**PI437726**	33	57	39	43	55	45
17	**PI494851**	36	60	41	47	58	48
18	**PI507256**	22	46	35	42	56	40
19	**PI507403**	27	54	33	40	52	41
	LSMean	**35**	**55**	**40**	**47**	**58**	**46**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

Table 57. Plant Height (inches) of soybean accessions in SAGE Test 6 (primarily maturity group V and later) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1].

Code	Name	Greenville, MS	Kinston, NC	Scott, MS	Athens, GA	Rohwer, AR	LSMean
1	**Graham**	24	38	22	25	28	27
2	**Boggs**	30	43	25	30	36	33
3	**Dillon**	31	44	32	30	38	35
4	**Haskell**	39	39	34	34	32	36
5	**PI506514**	16	32	17	26	25	23
6	**PI594172B**	30	37	29	34	40	34
7	**FC031933**	29	48	28	36	37	35
8	**FC032175**	31	44	26	34	38	35
9	**PI157440**	27	37	29	34	33	32
10	**PI198078**	31	40	33	32	35	34
11	**PI221717**	35	55	37	30	42	40
12	**PI408104**	27	39	21	31	33	30
13	**PI417263**	23	29	24	27	17	24
14	**PI423928**	22	37	23	32	26	28
15	**PI424390**	27	39	23	28	27	29
16	**PI437726**	36	49	40	36	46	41
17	**PI494851**	38	44	38	35	47	40
18	**PI507256**	19	31	12	28	22	22
19	**PI507403**	19	40	19	28	24	26
	LSMean	**28**	**40**	**27**	**31**	**33**	**32**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

Table 58. Plant Lodging score (1=erect, 5=prostrate) of soybean accessions in SAGE Test 6 (primarily maturity group V and later) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1].

Code	Name	Greenville, MS	Kinston, NC	Scottt, MS	Athens, GA	Rohwer, AR	LSMean
1	**Graham**	1.5	3.3	1.0	1.0	1.0	1.6
2	**Boggs**	1.5	2.5	1.5	2.5	1.0	1.8
3	**Dillon**	1.5	3.0	2.0	1.5	1.0	1.8
4	**Haskell**	2.5	2.3	2.8	2.5	1.0	2.2
5	**PI506514**	1.8	3.5	1.0	2.0	1.0	1.9
6	**PI594172B**	2.5	3.5	2.3	2.5	1.0	2.4
7	**FC031933**	2.8	3.3	3.3	2.0	1.0	2.5
8	**FC032175**	2.3	2.0	2.3	2.0	1.0	1.9
9	**PI157440**	1.5	3.8	1.8	2.0	1.0	2.0
10	**PI198078**	3.5	3.0	3.0	3.0	1.0	2.7
11	**PI221717**	3.8	3.3	3.5	2.1	1.0	2.7
12	**PI408104**	1.8	1.3	1.3	2.0	1.0	1.5
13	**PI417263**	2.0	3.0	1.8	2.0	1.0	2.0
14	**PI423928**	2.0	4.3	1.8	2.5	1.5	2.4
15	**PI424390**	2.5	3.8	2.3	3.0	1.5	2.6
16	**PI437726**	2.5	3.3	2.3	2.5	1.5	2.4
17	**PI494851**	2.0	1.0	2.8	2.0	2.0	2.0
18	**PI507256**	1.5	3.8	1.0	2.5	1.0	2.0
19	**PI507403**	1.8	2.5	1.8	2.5	1.0	1.9
	LSMean	**2.2**	**3.0**	**2.1**	**2.2**	**1.1**	**2.1**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.

Table 59. Seed Weight (g/100 seed) of soybean accessions in SAGE Test 6 (primarily maturity group V and later) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1].

Code	Name	Greenville, MS [2]	Kinston, NC	Scott, MS [2]	Athens, GA	Rohwer, AR [2]	LSMean
1	**Graham**	.	12.3	.	14.1	.	13.2
2	**Boggs**	.	12.0	.	15.6	.	13.8
3	**Dillon**	.	14.3	.	17.3	.	15.8
4	**Haskell**	.	14.3	.	18.6	.	16.4
5	**PI506514**	.	17.2	.	22.8	.	20.0
6	**PI594172B**	.	16.5	.	21.7	.	19.1
7	**FC031933**	.	11.9	.	15.0	.	13.5
8	**FC032175**	.	11.1	.	14.7	.	12.9
9	**PI157440**	.	12.0	.	16.0	.	14.0
10	**PI198078**	.	15.9	.	14.5	.	15.2
11	**PI221717**	.	13.3	.	16.3	.	14.8
12	**PI408104**	.	13.9	.	17.0	.	15.4
13	**PI417263**	.	13.7	.	15.6	.	14.6
14	**PI423928**	.	18.6	.	22.9	.	20.7
15	**PI424390**	.	6.9	.	8.8	.	7.8
16	**PI437726**	.	12.2	.	15.4	.	13.8
17	**PI494851**	.	13.5	.	16.1	.	14.8
18	**PI507256**	.	18.7	.	21.7	.	20.2
19	**PI507403**	.	18.3	.	19.8	.	19.1
	LSMean	.	**14.0**	.	**17.0**	.	**15.5**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 60. Seed Quality score (1=good, 5=poor) of soybean accessions in SAGE Test 6 (primarily maturity group VI and later) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	Name	Greenville, MS [2]	Kinston, NC [2]	Scott, MS [2]	Athens, GA	Rohwer, AR [2]	LSMean
1	**Graham**	.	.	.	2.3	.	2.3
2	**Boggs**	.	.	.	2.0	.	2.0
3	**Dillon**	.	.	.	2.0	.	2.0
4	**Haskell**	.	.	.	1.8	.	1.8
5	**PI506514**	.	.	.	2.8	.	2.8
6	**PI594172B**	.	.	.	2.0	.	2.0
7	**FC031933**	.	.	.	2.3	.	2.3
8	**FC032175**	.	.	.	2.0	.	2.0
9	**PI157440**	.	.	.	3.0	.	3.0
10	**PI198078**	.	.	.	2.0	.	2.0
11	**PI221717**	.	.	.	2.4	.	2.4
12	**PI408104**	.	.	.	2.5	.	2.5
13	**PI417263**	.	.	.	3.0	.	3.0
14	**PI423928**	.	.	.	3.3	.	3.3
15	**PI424390**	.	.	.	2.0	.	2.0
16	**PI437726**	.	.	.	2.3	.	2.3
17	**PI494851**	.	.	.	2.3	.	2.3
18	**PI507256**	.	.	.	3.3	.	3.3
19	**PI507403**	.	.	.	3.3	.	3.3
	LSMean	.	.	.	**2.5**	.	**2.5**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

Table 61. Shattering score (0= none, 9=81-90% of pods shattered) of soybean accessions in SAGE Test 6 (primarily maturity groups VI and later) evaluated in 1999. Means are presented as LSMeans from the GLM procedure of SAS[1]. Shattering occurred after harvest and did not affect yield.

Code	Name	Greenville, MS	Kinston, NC [2]	Scott, MS [2]	Athens, GA [2]	Rohwer, AR	LSMean
1	**Graham**	1.0	.	.	.	1.0	1.0
2	**Boggs**	1.0	.	.	.	1.0	1.0
3	**Dillon**	1.0	.	.	.	1.0	1.0
4	**Haskell**	1.0	.	.	.	1.0	1.0
5	**PI506514**	4.0	.	.	.	1.0	2.5
6	**PI594172B**	1.0	.	.	.	1.0	1.0
7	**FC031933**	1.0	.	.	.	1.0	1.0
8	**FC032175**	1.0	.	.	.	1.0	1.0
9	**PI157440**	1.0	.	.	.	1.0	1.0
10	**PI198078**	1.0	.	.	.	1.0	1.0
11	**PI221717**	1.0	.	.	.	1.0	1.0
12	**PI408104**	1.0	.	.	.	1.0	1.0
13	**PI417263**	4.0	.	.	.	3.0	3.5
14	**PI423928**	1.5	.	.	.	2.1	1.8
15	**PI424390**	3.0	.	.	.	1.0	2.0
16	**PI437726**	1.0	.	.	.	1.0	1.0
17	**PI494851**	1.0	.	.	.	1.0	1.0
18	**PI507256**	6.0	.	.	.	5.0	5.5
19	**PI507403**	4.0	.	.	.	2.0	3.0
	LSMean	**1.9**	.	.	.	**1.4**	**1.6**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] This trait was not recorded at this location in 1999.

TEST 6

COMBINED RESULTS FOR 1998 AND 1999

Table 62. Two-year summary for yield of soybean accessions in SAGE Test 6 (primarily maturity groups VI and later) evaluated in 1998 and 1999. Means are presented as LSMeans from the GLM procedure of SAS [1].

Code	PI Number	MG [2]	Yield (bu/ac)			Yield as Percent of Appropriate --- Maturity Check(s) [4] ---		
			1998	1999	'98/'99 [3]	1998	1999	'98/'99 [3]
1	**Graham**	V	44.9	35.0	40.0			
2	**Boggs**	VI	50.4	41.3	45.9		%	
3	**Dillon**	VI	50.0	40.2	45.1			
4	**Haskell**	VII	45.8	32.3	39.1			
5	**PI506514**	VI	30.9	19.7	25.3	62	48	55
6	**PI594172B**	VII	27.7	20.0	23.9	60	62	61
7	**FC031933**	VI	35.8	26.5	31.2	71	65	68
8	**FC032175**	VI	37.9	28.7	33.3	75	70	73
9	**PI157440**	V	37.1	26.5	31.8	74	65	70
10	**PI198078**	VII	33.8	21.1	27.5	74	65	70
11	**PI221717**	VI	35.3	30.4	32.9	77	94	84
12	**PI408104**	V	32.5	22.1	27.3	65	54	60
13	**PI417263**	V	22.2	18.6	20.4	49	53	51
14	**PI423928**	V	36.4	25.4	30.9	72	62	68
15	**PI424390**	V	28.5	22.9	25.7	57	56	56
16	**PI437726**	VI	46.1	30.5	38.3	92	75	84
17	**PI494851**	VI	46.5	31.5	39.0	93	77	86
18	**PI507256**	V	24.8	9.9	17.4	55	28	44
19	**PI507403**	V	26.7	16.9	21.8	59	48	55
	LSMean		**36.5**	**26.3**	**31.4**	**69**	**61**	**66**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 6 edition. Cary, NC. 956 pp.
[2] Maturity group assigned by USDA Soybean Germplasm Collection.
[3] Yield averaged over 1998 and 1999.
[4] Yield as Percent of Check(s) was calculated by dividing accession yield by the yield of the appropriate check (or checks averaged together).

Table 63. Two-year summary (1998 and 1999) of overall agronomic performance of Asian soybean varieties in the SAGE Test 6 (primarily maturity groups V and later). Means are presented as LSMeans from the GLM procedure of SAS [1]. Only traits that were recorded in both years are reported here.

Code	PI Number	Yield (bu/a) [2]	Maturity (Sept 1=1)	Plant Height (in)	Lodging (1 to 5) [3]	100-Seed Weight (g)	Shattering (0 to 9) [4]
1	**Graham**	40.0	30	28	1.9	13.9	0.8
2	**Boggs**	45.9	42	33	2.2	14.0	0.8
3	**Dillon**	45.1	39	36	1.9	15.7	0.8
4	**Haskell**	39.1	52	39	2.6	17.2	0.8
5	**PI506514**	25.3	40	25	1.9	18.8	3.0
6	**PI594172B**	23.9	50	35	2.7	17.5	2.2
7	**FC031933**	31.2	41	35	2.7	13.0	1.3
8	**FC032175**	33.3	42	34	2.4	12.8	0.8
9	**PI157440**	31.8	35	34	2.4	14.0	1.8
10	**PI198078**	27.5	51	35	3.3	14.3	1.2
11	**PI221717**	32.9	48	39	2.6	15.0	0.8
12	**PI408104**	27.3	36	31	2.1	15.0	1.9
13	**PI417263**	20.4	32	23	2.1	14.8	2.9
14	**PI423928**	30.9	36	29	2.3	20.4	3.3
15	**PI424390**	25.7	36	28	2.6	8.2	1.8
16	**PI437726**	38.3	38	40	2.9	14.9	0.8
17	**PI494851**	39.0	41	39	2.3	14.9	0.8
18	**PI507256**	17.4	32	25	2.1	20.7	5.4
19	**PI507403**	21.8	34	27	2.4	18.4	4.1
	LSMean	**31.4**	**39**	**32**	**2.4**	**15.4**	**1.8**

[1] SAS Institute Inc. 1985. SAS user's guide: Statistics, Version 5 edition. Cary, NC. 956 pp.
[2] Four locations were used in calculating the yield LSMean, see individual location tables for the rest of the traits.
[3] 1=best, 5=worst.
[4] 0=none; 9=80-90% shattering. Shattering occurred after harvest and thus, did not affect yield results.

Table 64. Two-year summary (1998 and 1999) of seed protein, oil and fatty acid analysis of exotic soybean varieties in the SAGE Test 6 (primarily maturity group VI and later).

				Fatty Acid Composition [1] [3]					
CODE	Entry	Oil	Pro	16:0	18:0	18:1	18:2	18:3	Total Sats. [2]
		%							
1	GRAHAM	21.6	42.1	10.8	4.4	21.8	56.1	7.0	15.2
2	BOGGS	20.7	43.6	10.8	3.4	25.4	54.4	6.1	14.1
3	DILLON	20.5	43.2	9.9	3.8	25.8	54.2	6.4	13.6
4	HASKELL	20.4	42.5	11.0	4.3	22.8	55.3	6.8	15.2
5	PI506514	19.5	44.0	10.2	3.5	21.9	57.4	7.2	13.6
6	PI594172B	19.7	44.3	10.4	3.6	25.5	54.2	6.5	14.0
7	FC031933	18.5	45.2	11.2	5.2	25.3	51.8	6.8	16.3
8	FC032175	20.0	44.4	10.7	5.1	22.1	55.4	6.8	15.8
9	PI157440	19.7	43.0	11.3	3.9	23.7	54.4	6.8	15.2
10	PI198078	17.3	45.2	9.9	4.0	28.2	51.7	6.2	13.9
11	PI221717	19.9	43.4	10.0	3.3	24.8	55.9	6.1	13.3
12	PI408104	18.7	44.4	11.0	4.0	24.6	53.6	7.0	15.0
13	PI417263	20.0	43.7	11.4	3.9	23.0	55.1	6.9	15.2
14	PI423928	19.4	44.1	10.3	4.2	29.3	49.2	7.2	14.4
15	PI424390	15.9	47.0	11.3	4.2	23.1	54.2	7.3	15.5
16	PI437726	20.3	43.1	10.9	4.2	26.7	53.1	5.3	15.1
17	PI494851	20.5	42.8	10.8	3.9	25.9	54.0	5.6	14.7
18	PI507256	18.6	44.9	12.1	4.3	29.4	48.8	5.5	16.4
19	PI507403	18.4	44.7	11.3	4.2	23.1	54.5	7.2	15.5
	LSMEAN	19.4	44.0	10.8	4.0	24.8	53.8	6.5	14.8

[1] 16:0=Palmitic acid; 18:0=Stearic acid; 18:1=Oleic acid; 18:2=Linoleic acid; 18:3=Linolenic acid.
[2] Total of saturated fatty acids (16:0 + 18:0).
[3] Means for this table were obtained through computer analysis of the raw data for each trait. Means were then rounded off to the nearest tenth of a percent. As a result of round off procedures, the percentages of fatty acids may not sum to 100.0 exactly. Similarly, the values in the 16:0 and 18:0 columns may not sum to the values in the Total Sats. Column exactly.

ERRATA

(Corrections to SAGE 1998 Book)

Many thanks to Dr. Elroy Cober (Agriculture and Agri-Food Canada) for noticing the errors in SAGE 1998 Test 1 summary and alerting us to the problem.

Correction #1. Correction for SAGE 1998 Test 1 Tables 5, and 7 through 12. The names of entries 7 through 11 were accidentally pasted over the names of entries 6 through 10. Table 65 depicts the tables as they appeared in the 1998 SAGE book on the left and how they should look when corrected on the right.

1998 SAGE Book Test 1			
	Uncorrected		Corrected
Code	PI Number		PI Number
1	9171		9171
2	Lambert		Lambert
3	Parker		Parker
4	PI511866		PI511866
5	PI592919		PI592919
6	**PI592923**	→	**PI592921**
7	**PI593972**	→	**PI592923**
8	**PI088295**	→	**PI593972**
9	**PI361066A**	→	**PI088295**
10	**PI361075**	→	**PI361066A**
11	PI361075		PI361075
12	PI391583		PI391583
13	PI391594		PI391594
14	PI407710		PI407710
15	PI424195B		PI424195B
16	PI427099		PI427099
17	PI436682		PI436682
18	PI445830		PI445830
19	PI445837		PI445837

Correction #2. Correction to Table 1 in SAGE 1998 book. Three of the errors in the entry names shown above in Correction #1, also appear in Table 1 of the SAGE 1998 Book. Corrections appear below.

Incorrect PI Number	Corrected PI Number	Correct Accession Name	Country of Origin	MG	SAGE Test Name	Yield (bu/ac)	Yield as Percent of Check(s)
PI592923 [1]	**PI592921**	Hei nong No. 37	China	I	1	51	**88**
PI361066A [2]	**PI088295**		Yugoslavia	I	1	48	**82**
PI088295	**PI593972**	Suzumaru	Japan	I	1	47	**81**

[1] PI592923 actual yield of 36 (bu/ac), which was 70% of appropriate checks.

[2] PI361066A actual yield of 45 (bu/ac), which was 77% of appropriate checks.

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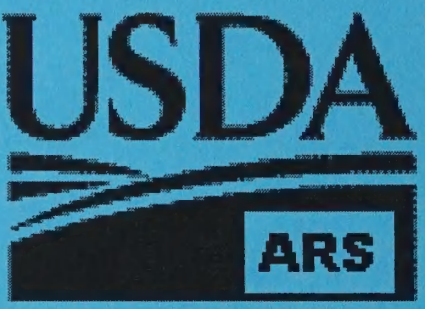

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